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WINDOWS 10

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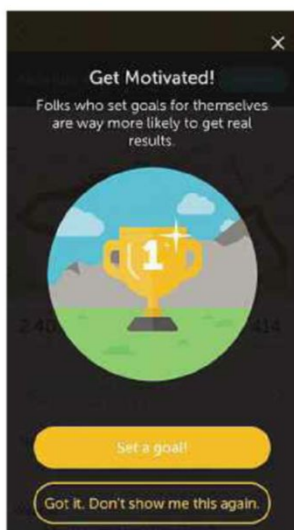
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60 Understanding The Linux Command Line

One of the key characteristics of Linux is how much of it requires the use of the command line. Whether that's a good thing or not depends on your point of view, but the fact is knowing your way around the terminal is definitely something worth learning. That's why we asked Leo Maxwell to guide you through it

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Windows 10 In 2016

**With a 2016 underway, David Crookes
looks at the plans Microsoft has for
Windows 10 this year**

It would appear that 2016 is going to be Windows 10's golden year – a 12-month period when it finally firms its grip and puts to bed the memories of Microsoft's operating systems of years gone by. For the first time, the Redmond-based computer giant is going to all but force its new OS on people in a move to ensure that its take-up is like nothing else before. As a result, analyst Gartner says migration to Windows 10 will be the fastest yet and that, in 2016, it will become the default OS for consumers and business.

Windows 10 was released in July and, in 2015, users were allowed to make the decision to upgrade by themselves. In 2016, that is set to change. Users who have not already moved to the new operating system are finding that the OS has been controversially and quietly downloaded on to their systems in the background. And suddenly, it will move from being an Optional Update within Windows Update to a Recommended Update – something that will see it installed on any system set to automatically process it.

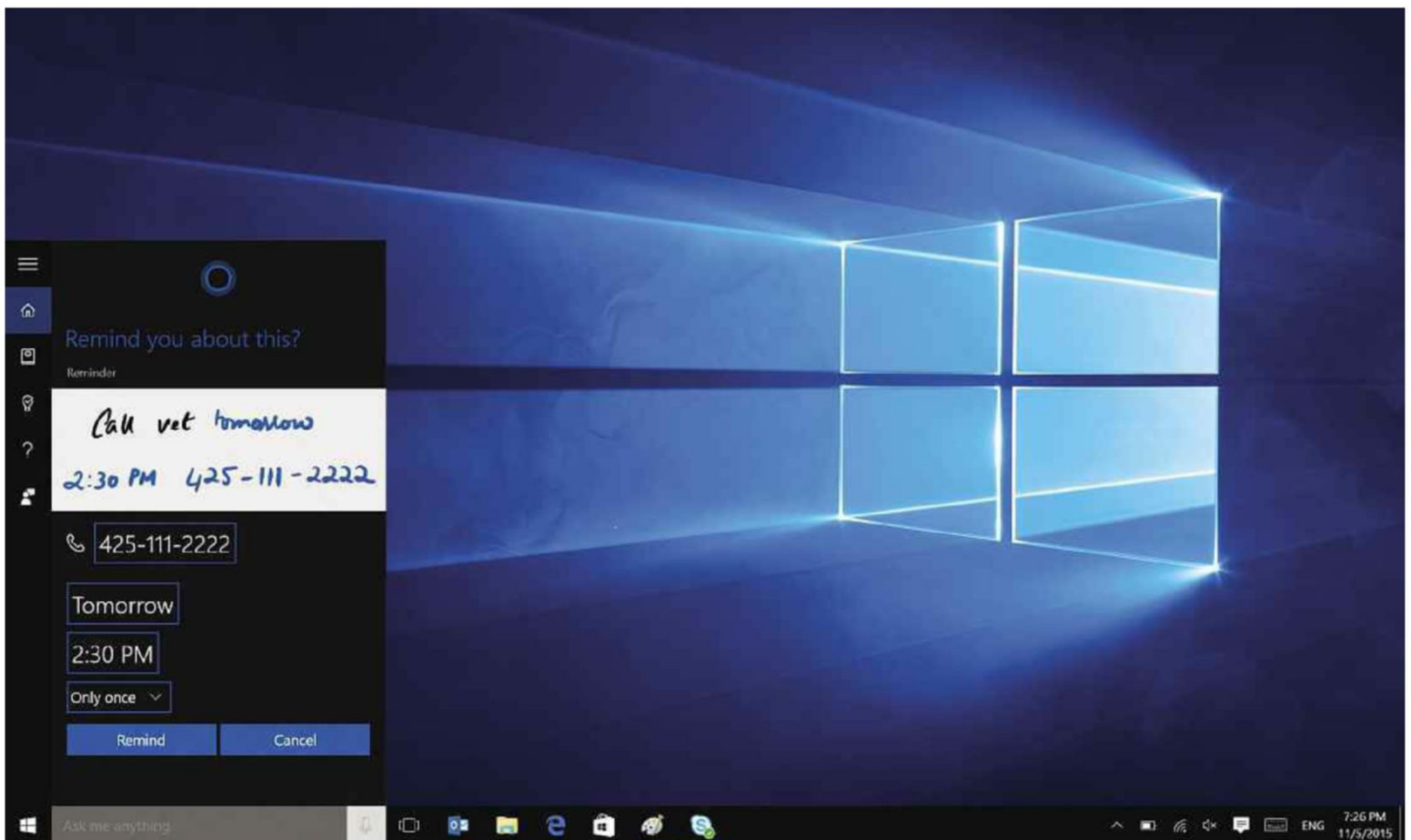
Although there will be a 31-day period in which people can revert back to the previous OS, Microsoft knows this will not happen in any great numbers. Once it's on people's machines, most folk will learn the new rules and layouts and get on with it, believing the hassle of reverting back to be too much. In the process, Windows 10's market share will soar from the 9% it currently enjoys. It will zoom past Windows XP, which is currently

on 10.59%, obliterate Windows 8's 14.03% and gnaw away at Windows 7's 56.11%.

At that point, people will truly care what Microsoft does with Windows 10 and, thankfully, the company does seem to have enough plans in 2016 to make the switch more than worthwhile. "It's really a kind of no-brainer upgrade," analyst Rob Enderle of the Enderle Group tells us, adding that it should be a shot in the arm the corporate sector in particular needs to hurry things along. "Companies often move very slowly, and much of the hardware that will be hard to move is Windows XP or older, and those folks will still move at their own rate, but that's old hardware and you'd think it would mostly be funded to be replaced this year."

The Plans

So what has Microsoft likely got up its sleeves for 2016? First of all, the next Windows 10 update is due to be released in 2016, following on from Threshold 2, which is now available. Codenamed Redstone and due out in the summer, nothing has been set in stone, but the smart money is on greater integration with Cortana, which will float around the desktop, appearing on top of documents and ready to offer assistance at all times. According to reports, it will be akin to a powerful search tool, which integrates into the various features of Windows as well as Office, allowing access to a vast knowledge bank that will dish out lots of useful information.



▲ Cortana is going to be set free in Windows 10 during 2016

Cortana will also bring extra functionality to Windows 10. By speaking commands, you will be able to quickly control the volume, for example, or turn off notifications. It will therefore become a key way to interact with the operating system, and while there have been comparisons to the much-ridiculed Clippy, we'd be shocked if Microsoft went down that sort of path again.

Instead, by unleashing Cortana from the Start box, it's set to be less intrusive, and it would appear to fit in with Microsoft's philosophy as put forward by Microsoft CEO Satya Nadella, who says such virtual assistants will alter the way we browse the web. It could well become the biggest shake-up of how we use our

“ Our online conversations will increasingly be mediated by conversation assistants ”

computers, especially if it starts to learn our behaviour and suggest ways of improving our day-to-day use.

“Our online conversations will increasingly be mediated by conversation assistants who will help us laugh and be more productive. This will lead us to question and blur the way we think about our computers, phones and our memories and relationships,” says Lili Cheng, Microsoft Research Next's Distinguished Engineer and General Manager, in a piece on the Microsoft website asking for 2016 predictions.

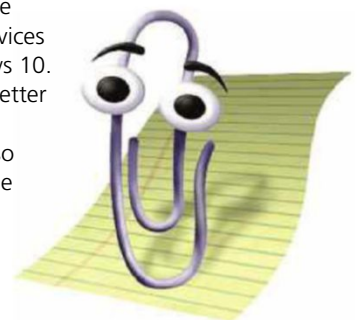
Verbal communication with computers is something which intrigues Microsoft, and the predictions point to 2016 being a big

year for artificial intelligence. There's a sense within the company that we'll be using assistants like Cortana to help us understand tasks and work on them. To that end, more work will be carried out on enhancing Windows 10's language capabilities using existing and new technologies.

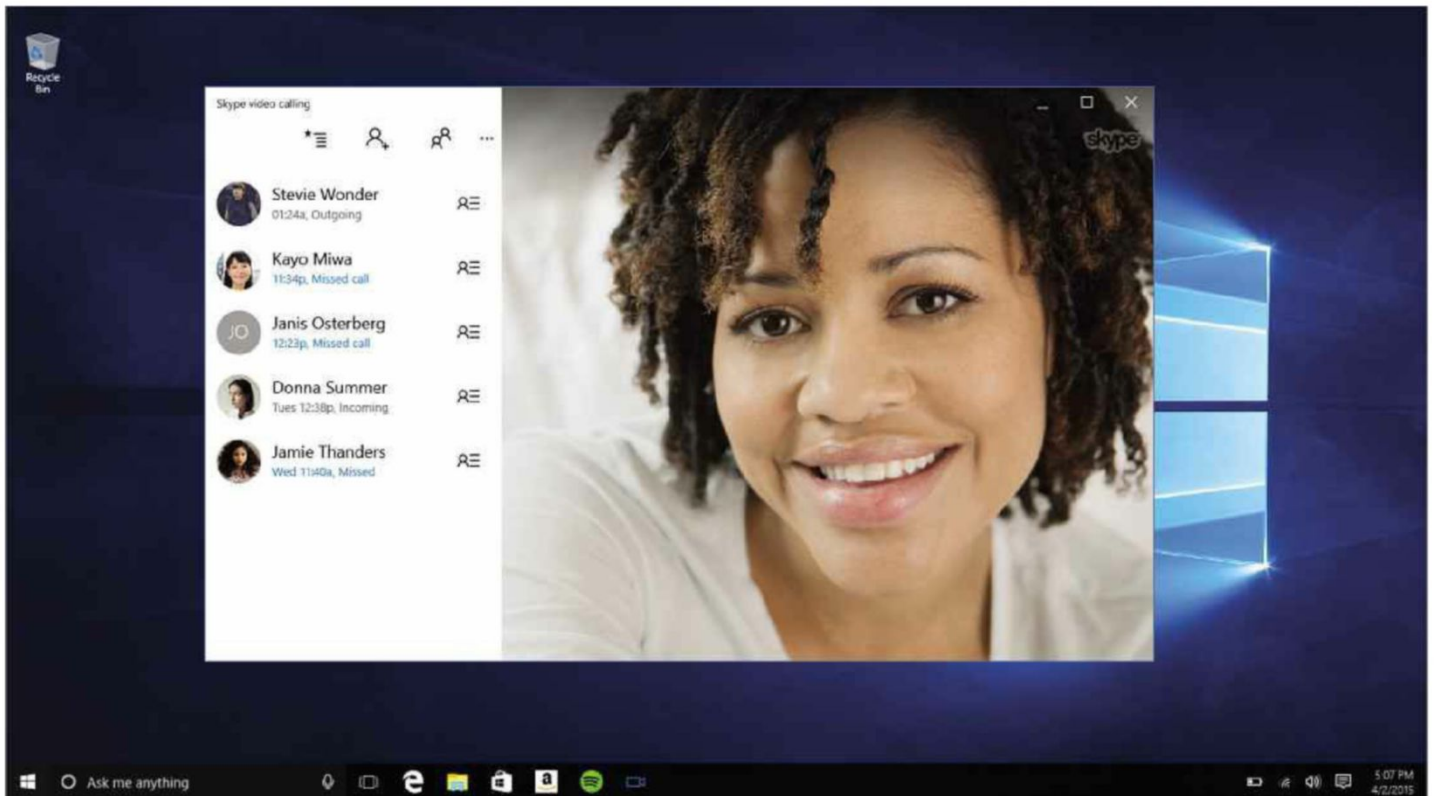
Skype, which Microsoft bought in 2011 for \$8.5 billion, is likely to play a larger role as a result. Microsoft's people have been working on Skype Translator, which helps you to communicate across language barriers in real-time so, for instance, you can talk to a French person in English and have them understand you. It's not perfect, but it does work. Li Deng, Partner Research Manager for Microsoft Research Next, says, “There will be continued rapid progress in natural language processing [in 2016] based on deep learning methods, and state-of-the-art machine translation performance may be set by attention-based sequence learning techniques based on deep learning.”

Seamless Computing

Windows 10 will also improve the Notification Centre with widgets set to be introduced to allow for speedy snapshots of data, and there will be better integration between the services offered by Office 365 and Windows 10. Indeed, Windows 10 seeks to be better integrated with the most common apps and utilities we use, and it also wants to expand its reach so people are able to work across devices.



► Cortana will deliver handy hints but hopefully not like Clippy



▲ Skype may well form an even larger part of Windows 10 in the near future

"Over the next 12 months, Microsoft is likely to push Continuum hard as the next two generations of phones come to market," says Enderle. The feature will know the device you're using and switch effortlessly to the best user interface. "The rumoured Surface phone, or whatever they call it, should be the linchpin to this, as they move to showcase the full power of a smartphone that can carry a PC load." Continuum will be a feature of the Lumia 950 and 950XL.

It will enable smartphones to offer a full Windows desktop experience, and it will allow handsets to be connectable to keyboards, mice and monitors. Whatever is shown on the

“ Microsoft is expected to put a huge effort into Windows Store for Business ”

smartphone screen would be mirrored on the monitor, and it would allow for an effective computer that could be stored in your pocket.

Kevin Gallo, vice president of the Windows developer platform, is even looking to bring desktop Windows 10 apps – or Win32 programs – to Windows 10 Mobile. Such a move would produce a unique ecosystem that could have the power to better that of rival Apple, which is also looking at greater integration of its desktop and mobile operating systems.

Richard Edwards, the principal research analyst at Ovum, tells us that this will go hand in hand with a greater push towards encouraging potential upgraders to embrace Windows 10. "From a usability perspective, Windows 10 may be familiar, but

it's also intimidating to many users, especially those who have never had any formal Windows training," he says. "So as iOS and Android climb up the sophistication ladder, Microsoft must find a way to climb down a couple of rungs. This may well come in the guise of Windows 10 Mobile, but not necessarily in a smartphone form factor."

Surface Phone

The second half of 2016 is set to see the introduction of a new Surface premium smartphone. Details are scant because the head of Surface, Panos Panay, is keeping them very close to his chest, but it's understood the new gadget will be powered by Intel, come in an all-metal case and, crucially, run Windows 10 Mobile.

Rumours suggest the phone will also come in two versions which, like the iPhone, will differ primarily in size. The larger of the two is said to have a 2K quad HD display measuring 5.5 or six inches, which will be a small but nevertheless noticeable advance on the 5.2 inches of the expected smaller unit.

Whether or not the phone will be Surface Pen compatible remains to be seen, but it does appear to be within Microsoft's thinking. Bill Buxton, Principal Researcher at Microsoft Research, certainly believes it to be important.

"57 years after the first lightpen, 53 years after the first stylus-driven graphics tablet, 27 years after the first stylus-driven slate computer and 14 years after Microsoft launched the Tablet PC, stylus-based drawing, annotation and note-taking will assume a broadly supported and appropriate place in the mosaic of how we interact with digital devices," he said when asked for his 2016 prediction. Expect it to form an integral part of Microsoft's products.

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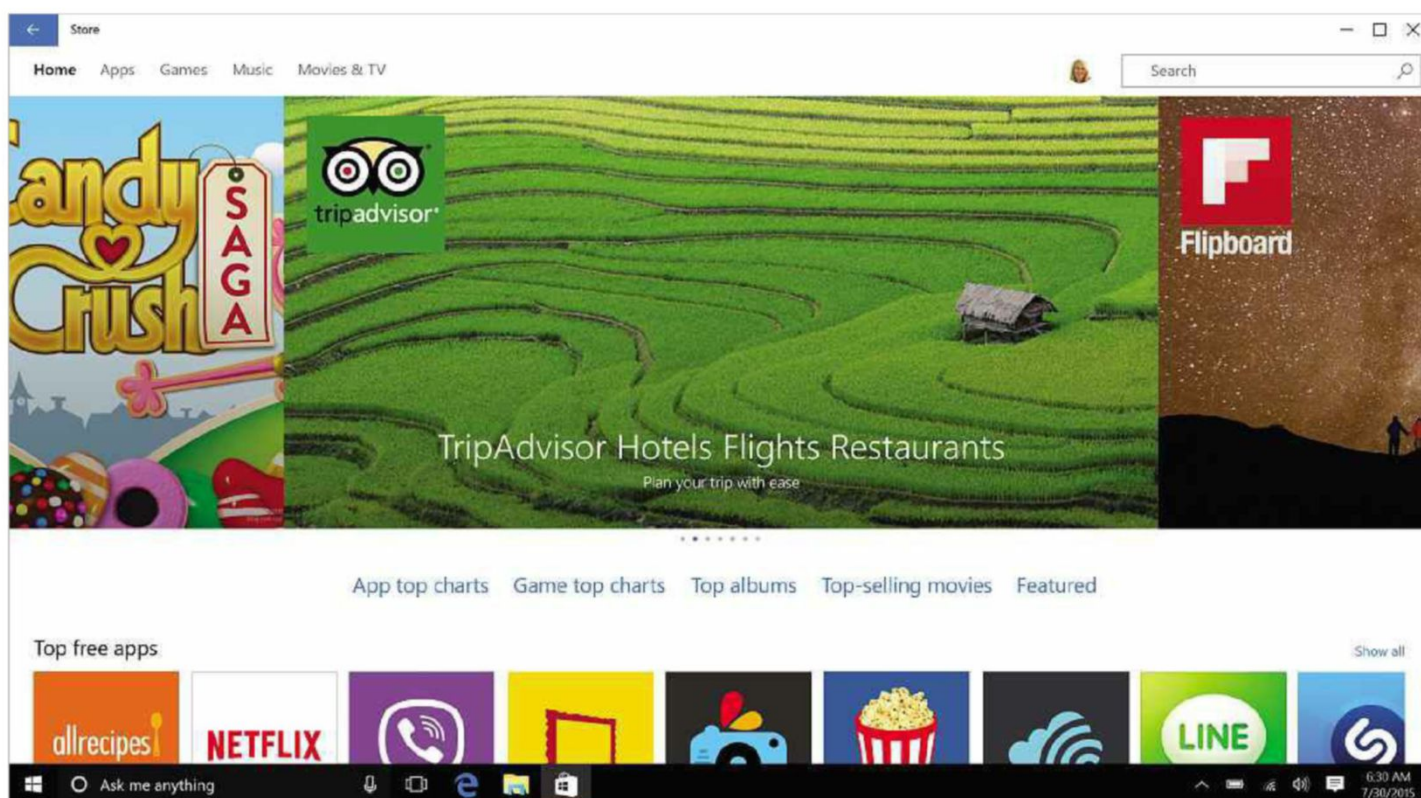


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▲ Windows Store is going to become more prominent, especially for businesses, over the next 12 months

Security

One of the biggest aspects of Windows 10 that Microsoft may have to look at more keenly in 2016 is the issue of privacy. In 2015, Threshold 2 – the November update – increased the potential to be spied on. In fact, Microsoft's corporate vice president, Joe Belfiore, admitted Windows 10 tracked how users were operating the system and that the data was being sent back to be analysed. It has led to some pressure being put on Microsoft to educate users to better

“ Microsoft will likely focus mostly on security and management ”

tweak the settings so they can determine what information is collected about their activity.

In Microsoft's favour, it does seem to be keenly aware of the issues of privacy, which is why it pulled the update when it found that some of the preferences were not being retained, opening people up to issues surrounding background apps and advertising ID. It was concerned that the privacy settings were being overwritten and took action. But with a greater push in 2016 in the corporate market, such things will be very important to address. "Microsoft will likely focus mostly on security and management as they move from a consumer message to a corporate message to continue to fuel the long-delayed PC replacement cycle," says Enderle.

Failing to address such things would hamper Microsoft's progress which, according to Gartner, is set to be great. It says 50% of enterprises will have begun to switch to Windows 10 before the year is out. The first half of this year is therefore going to see many

enterprises planning to begin pilots for Windows 10 and "broaden their deployments in the latter part of the year."

"In the consumer market, a free upgrade coupled with broad legacy device support and automatic over-the-air upgrades ensures that there will be tens of millions of users familiar with the operating system (OS) before the end of 2015," said Steve Kleynhans, research vice president at Gartner. "For enterprises, we expect that implementation will be significantly more rapid than that seen with Windows 7 six years ago."

Back To The Future

This is how Windows 10 got itself to this point:

- 2011: Andrew Lees, then chief of Microsoft's mobile technologies, announced a plan to create a single eco-system linked by Windows.
- 2012: Windows 8 was released, bringing some major changes to the user interface. The Start button was scrapped and there was an emphasis on touchscreen.
- 2013: Microsoft was said to be working on an update to Windows 8 codenamed Threshold.
- 2014: Another OS was said to be planned called Blue, but that became Windows 8.1. It brought back the Start menu.
- 2014: Threshold was finally announced as Windows 10. It was, as Lees had said, a unified platform, but it shocked people that it wasn't going to be called Windows 9.
- 2015: Windows 10 was released, allowing those using Windows 7 and Windows 8/8.1 to upgrade for free. The Start menu returned, and there were two modes for mice/keyboard combos and touch-control.

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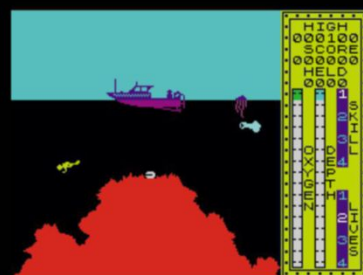
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Apps available from App Stores. The recreated Sinclair ZX Spectrum is, by design, a wireless controller for use with iOS (and selected Android) devices, games and apps including the FREE 'Recreated Sinclair ZX Spectrum' iOS / Android apps (available from App Stores). New games available with each update of the apps. Current available Bluetooth keyboards when used with iOS (and selected Android) devices can't track key releases, limiting their use to simple word processing tasks or to use as controllers for slow role playing games. The recreated Sinclair ZX Spectrum's custom hardware and clever firmware has been specifically-engineered to offer optimal response for fast 'twitch' games (and indeed other apps) on iOS (and selected Android) devices. Developers are encouraged to use the device as a wireless controller for their own iOS and Android apps. Notice: No responsibility for 3rd-party, devices, games and apps is accepted. Trademarks acknowledged. The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Ceratech Accuratus Limited is under license. Other trademarks and trade names are those of their respective owners.



According to Edwards, Microsoft will be putting more of its efforts into the business space in 2016. "I expect Microsoft will focus on helping large enterprises protect and secure their computing assets, whether desktop, server, mobile or Internet of Things," he says. "Data protection has to be top of the agenda, which means preventing data leakage with minimal impact to employees and their work practices. I also expect Microsoft will match its client-side efforts with cloud and on-premises information security management services and products."

Microsoft is expected to promote the smooth upgrade path of the OS, showcasing how productive, secure and compliant Windows 10 can be. It will also be promoting the future of Windows 10 beyond 2016, declaring it to be the last version of Windows, a statement giving businesses the confidence that they can upgrade to it and not feel that something else is going to come along and supplant it in a few years time. Service branches will tailor Windows 10 to business needs, and it should provide a boost to the operating system and the PC market in general.

Windows Store

Edwards also believes that Microsoft will put a huge effort into Windows Store for Business this year. It emerged in November as a way to quickly find and install apps either on their own or en masse, and it looks set to be rolled out as part of a Windows 10 upgrade in 2016. "It will be the go-to place for applications that help employees get work done," Edwards tells us. "But while the Windows Store for Business will help IT departments provision and deploy new Universal Windows Apps (home-grown and COTS) to Windows 10 computers and devices, Microsoft can't ignore those 'old' Win32 applications. Application virtualisation technology will help here, but it will need to be fully 'operationalised'."

Microsoft won't be forgetting consumers, though. Windows Store will also be enhanced further, with greater promotion of universal Windows apps. We saw a scheme in America over Christmas, which allowed customers to pick ten of the best 2015 albums for free. The idea is to introduce people to the Windows Store and encourage them to use it in the future. It's a crucial, money-spinning area for Microsoft that brings software, mobile apps, games and entertainment into one place.

On The Surface

As well as concentrating on the operating system, Microsoft has an interest in hardware, with the Surface Book an important flagship element. Last year wasn't great for the device, though. It was prone to crashes, suffered battery problems, and the screen sometimes fell short of expectation.

But Richard Edwards, Principal Research Analyst at Ovum, says Microsoft will work on the hardware and come up with something spectacular this year. "My hardware punt for 2016 is a Surface Book ('Galaxy Class'), where the screen separates like it does today, only the screen will actually be an Intel-based tablet running Windows 10 Mobile.

"Continuum will take care of the 'saucer separation' manoeuvre, just like you've seen on *Star Trek*, and Office 365 will be the glue that makes the concept work. Both devices would operate independently when separate, though of course the base unit will require a display of some kind."

Browsing

What of Microsoft Edge? Edwards expects it will receive multiple updates throughout 2016. "The web browser is also part of today's application platform story," he says. Extensions were set to be built into the Edge browser last year, but they were delayed, so you can expect to see them integrated over the coming months instead. A leak in December showed that extensions were coming soon to a Preview version, and there was a web page made by Microsoft that announced "Extensions are here!", which was swiftly taken down. It showed the Pinterest Pin It button and the Reddit Enhancement Suite, and it also said that extensions would be manually added to enhance the experience of the browser.

AdBlock Plus has already been confirmed as one of the extensions that will be made available, controversially continuing its job of blocking adverts from websites in keeping with its abilities on Chrome, Safari, Opera and Firefox. On top of that, this month is seeing the Chakra JavaScript engine of the Edge browser opened up as an open-source project on GitHub. In a blog post

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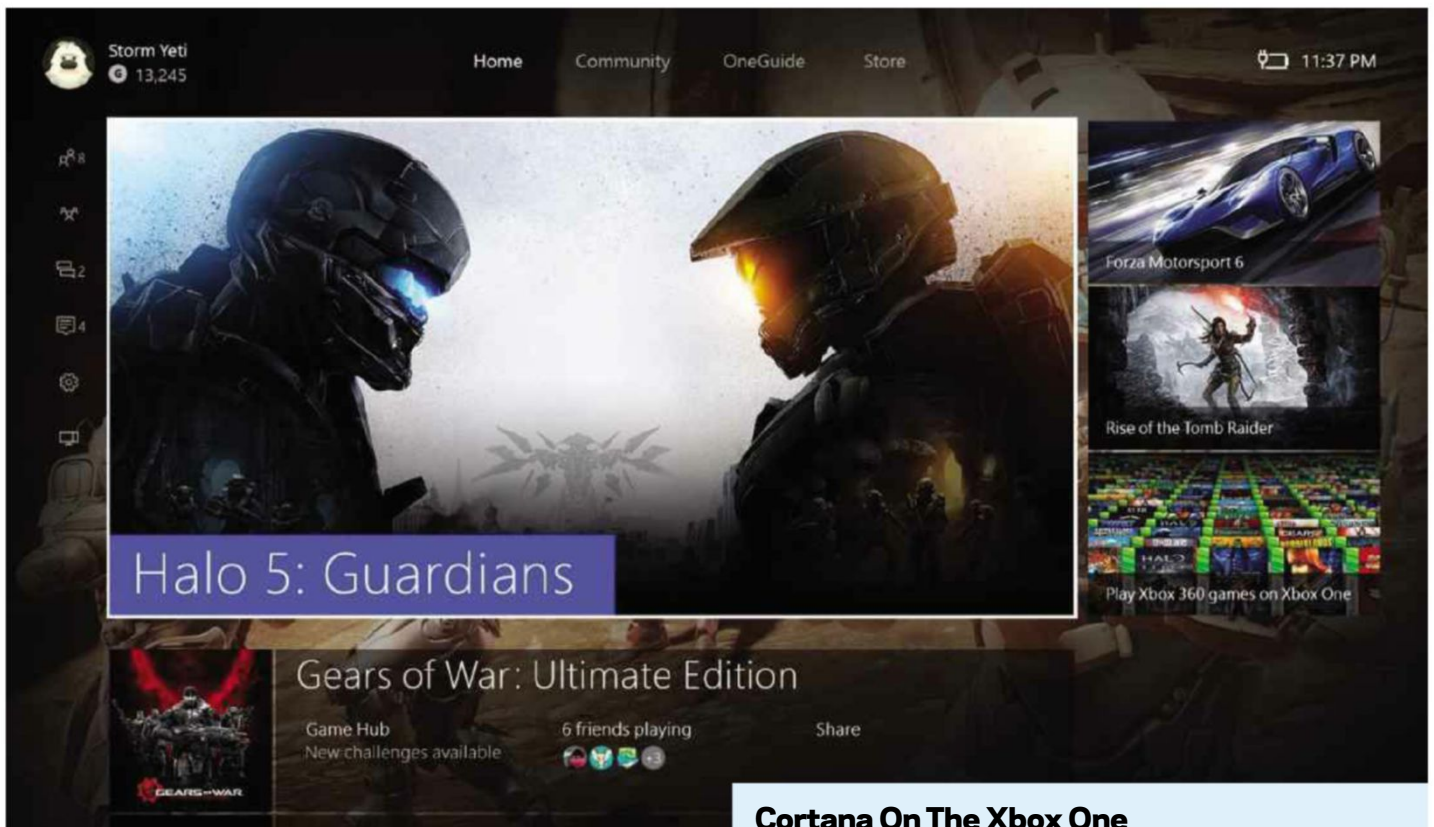
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Cortana On The Xbox One

It has been talked about for months, but this year Cortana is finally going to be making an appearance on Microsoft's Xbox One console. The Personal Digital Assistant has been included in the Xbox One Preview Program, which means gamers will soon be saying 'Hey Cortana' to ensure the service will be at their beck and call. Available to work with the Kinect sensor as well as through a gaming headset, it will form a key component of the entertainment hub that Microsoft is keen to create.

The Xbox One is part of the wider plans for Windows 10. Microsoft CEO Satya Nadella has said that the console is, to all intents and purposes, another Windows 10 machine. He told a Microsoft shareholder meeting that Windows 10 was set to appear on everything, whether it be laptops, desktops and tablets or the Xbox One. That would achieve Microsoft's long-term aim of putting a Windows computer in the living room and is the reason why the Xbox One is going to be blessed with Windows Store and why its operating system is built on the kernel of Windows 10.

With Cortana therefore available on a host of devices, 2016 could well be the year that everyone starts to use voice-activation without even thinking too much about it. Windows 10 will also be shown to be very flexible in this respect, able to work on lots of different technologies. Microsoft is even looking to get itself into the Internet of Things by pushing the Windows 10 IoT core this year.

It's designed to work with the likes of the Raspberry Pi 2, and it's showing its versatility, with developers coming up with facial recognition devices and the like. The big plan for Windows 10, then, is to get it on as many different platforms as it can possibly achieve so that it becomes ubiquitous. The benefit of this is that cross-platform compatibility will be achieved, cementing Microsoft's position in the OS space.

by Gaurav Seth and Adalberto Foresti, it will be under the MIT licence and include all of the key components of the JavaScript engine powering Microsoft Edge. It's a neat development.

"Today, outside of the Microsoft Edge browser, Chakra powers Universal Windows applications across all form factors where Windows 10 is supported – whether it's on an Xbox, a phone or a traditional PC," the blog author wrote. "It powers services such as Azure DocumentDB, Cortana and Outlook.com. It is used by (and optimised for) TypeScript. And with Windows 10, we enabled Node.js to run with Chakra, to help advance the reach of Node.js ecosystem and make Node.js available on a new IoT platform: Windows 10 IoT Core." It shows a greater sense of openness by Microsoft, allowing third parties to improve the code and evolve Chakra even faster.

Future

As the months go by, Microsoft's direction and plan for Windows 10 should become clearer. It still remains the make-or-break OS for the company, especially given that the relative failure of Windows 8 still looms over it. But Microsoft is adapting the way it has worked for years and considering new paths: the decision to bring apps together in the Windows Store and the opening up of development are two cases in point. There is not the sense of "Microsoft knows best" any more and there is a feeling that is more open and more willing to listen.

That, in itself, is the biggest plan for 2016: Microsoft will adapt to the market more nimbly than it has before. For a while it has said it wants Windows 10 to be a service rather than a product, and that will allow it to evolve. When you also look at the other products set to come on board, such as Microsoft HoloLens – which will also need to be integrated into the Windows 10 experience – you can see that diversity is at the heart of the OS. And by the end of 2016, we may well feel at one with it. [mm](#)

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10 Good Reasons To Stick With Windows 7

Mark Pickavance outlines some of the plausible motives you might have for passing on the free Windows 10 upgrade

As we're almost six months into the free upgrade period, it seems an appropriate time to consider the choice that is facing millions of Windows users. By making the upgrade free, Microsoft cleverly removed some cost (but not all) from the equation. But with regards to Windows 10, the devil, as they say, is most certainly in the detail.

Next week, I'll give ten good reasons to accept Microsoft's offer, but this week we'll look at a bunch of valid problems and concerns that might encourage you to stick with the OS you're currently running.

1. The Devil You Know

This might seem an obvious thing to say, but as you get older, continual change becomes a less compelling exercise and one you might like to avoid, given the chance. I've learned to use every version of Windows and Office so far, so surely Windows 10 is just another transition?

Yes, it is, but that doesn't mean it isn't annoying to find that methods that worked perfectly well since 2008 when Windows 7 arrived are now potentially void.

But actually, if you didn't use Windows 8, then Windows 10 is a more radical experience, as it still breaks with many of the traditions that stayed with Windows from 95 until 7.

While Microsoft can reel off a long list of improvements in its new OS, but one that it doesn't include is a full Windows 7 compatibility mode, which is one of the reasons that Enterprise stayed away from Windows 8 almost completely.

In fact, one of the biggest criticisms of Windows 8 was that when it arrived, there was no tutorial to guide you through the interface changes, and you were left to encounter the 'charms bar' and other obscure additions entirely by chance. Windows 10 does have more help, and it got rid of 'charms', but lots of parts don't work like Windows 7 or even Windows 8. The major bugbear I've noticed is that there are now two entirely separate



settings interfaces, one in the traditional control panel and another in 'settings'. An, there are overlaps in functionality, but equally there are things you can only do in one side. Opening the control panel to add system desktop icons only to find they're now missing and are in settings under 'Themes' (why?) is only the beginning. And with each subsequent patch and version release, more things move around.

Whereas Windows 7 remained largely unchanged since its conception, aside from bug fixes, Windows 10 is a continually shifting topology, often with very little warning or notice of what they've actually altered at each stage.

If you don't like change, then stick with Windows 7, because it isn't broken for the most part.

2. I Have A Full Windows Licence

This point highlights a flaw in the way that the free upgrade to Windows 10 works, in that it essentially converts all Windows 7 and 8 licences to the OEM model.

If you have a full retail version of Windows 7 or 8, then you're entitled to remove it from your existing PC, build a new one and then install it there.

With an OEM licence, once installed on a PC, the licence is then permanently glued to that hardware, and when it dies the licence expires with it.

Exactly how much flexibility Microsoft allows on hardware activation changes has long been debated, and it seems almost to depend on who you end up talking to in its support centre whether it will reactivate you after, say, a motherboard failure.

Clearly, Microsoft's thinking is that by converting these retail licences into Windows 10 OEM ones, they'll be removed from circulation once their host machines die, necessitating a new PC and a new licence sale. Therefore, by offering the free upgrade,



Microsoft has treated OEM and retail customers the same, to the detriment of those who paid full price for their OS.

The logic here would suggest that if you don't want your Windows 7 licence converting to Windows 10 OEM status, then you have three choices.

- Buy Windows 10.
- Buy an OEM version of Windows 7, and upgrade that.
- Don't upgrade.

“ If you don't like change, then stick with Windows 7, because it isn't broken, for the most part ”

Given that it's possible to still get Windows 7 OEM licences for £20, the second option might well be the preferable one, allowing you to keep your Windows 7 retail code for some other use.

A retail Windows 7 licence is worth more than the OEM one, even if the upgrade treats them as equal.

3. Software Compatibility

For this user, initially I concluded that most Windows 32-bit applications would run on Windows 10 without much of an issue, because in pre-release testing that seemed a reasonable conclusion to make, based on the software I'd tried. Most things ran on Windows 8, so surely Windows 10 would be the same? No, not exactly. And actually since release, Windows 10 has started to manifest a dislike to some applications that is rather aggressive.

If code won't run or causes a crash, that's one thing, but recent versions of Windows 10 have actively deleted apps that it has decided are incompatible with it. There isn't any choice or debate here; after the upgrade process completes, you're glibly informed that your application was deemed not to be compatible and has been removed!

What's really odd about this is that on a few occasions, I've then reinstalled exactly the same code, which Windows 10 has allowed, and it has run perfectly.





There's a fine line here that Windows 10 appears to be crossing, because the last time I checked, this was my computer, not Microsoft's, and in that respect, I decide what goes on and what comes off it.

However you interpret this, clearly Windows 10 is more paranoid about what code it considers to be acceptable on the platform than prior releases. And as it evolves, things it once was happy to run it suddenly takes exception to. Therefore, it isn't something you'd want to take chances with if you're running a mission critical tool, given that you can't effectively control the upgrades, and the potential for subsequent deletions.

Whatever the technical arguments against Windows 7, I've never seen it remove my software without any reference, and in that respect it's clearly preferable.

And that brings us neatly to the subject of the new policy regarding updates, which isn't to everyone's liking either.

4. Updates You Can Control

I wouldn't entirely recommend it, but on Windows 7 you can decide not to do updates, for whatever reason you decide. And there are occasionally very good reasons not to do this. Windows 8 first introduced the idea that Microsoft would like to change that control, and in Windows 10 the ability to defer updates entirely vaporised.

There are only two options with Windows 10: receive updates or get none. There is no cherry-picking the ones you'd like and ignoring those that do undesirable things to your system.

This can be a problem for home users, especially if they're connected to the internet via a metered connection, but it's a complete nightmare for business users. What a business user doesn't want is an update to be applied before the company IT team has had a chance to evaluate it and for it to do something undesirable.

“ Those who find Microsoft's attitude to personal privacy concerning won't be inspired by a service that it added recently called DiagTrack ”

To placate businesses, Microsoft has a greater degree of control over updates in the enterprise release, but you only get to delay them temporarily. Some updates are considered mandatory, so they'll have to be applied within a relatively short timescale even if that breaks your local systems.

IT departments that don't like this idea have a simple solution: stick with Windows 7, where they can defer some updates indefinitely if they prove to be problematic.

Without general acceptance in the business world, Windows 10 can't fully succeed, and given the failure of Windows 8 to penetrate that market, this might be a policy that Microsoft is forced to revise in time. But for now, this is a very good reason for business users to stick with Windows 7, where they have 100% control over updates.

5. Hardware Compatibility

This isn't something that Microsoft is talking much about, unsurprisingly, but a significant number of older computers have problems either running Windows 10 or the upgrade process to get you to it.

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The complete inability to run the OS is more likely on those machines that once ran Windows XP, but it's not exclusively true and some that ran Windows Vista and 7 can run into hardware-related problems.

Unless the PC just doesn't have a feature (like sufficient memory) to run Windows 10, then the problem is most likely driver related, because systems that rely on drivers that were either butchered from Windows 2000 or XP drivers might well break rules that Windows 10 applies to its driver model.

If you're unsure about your PC, the best policy is to swap your hard drive out for a blank one, if you have one spare, and try to fresh install Windows 10 using a USB key and the installation .iso you can get from Microsoft. If it errors or won't install, then you just avoided trashing your existing system to discover that problem.

There is a possibility that it will run a fresh installation and not an upgrade, probably because of the aforementioned driver issues. In that case, you'll be backing up your PC and doing a fresh installation, using the product key from Windows 7 to activate it (hopefully).

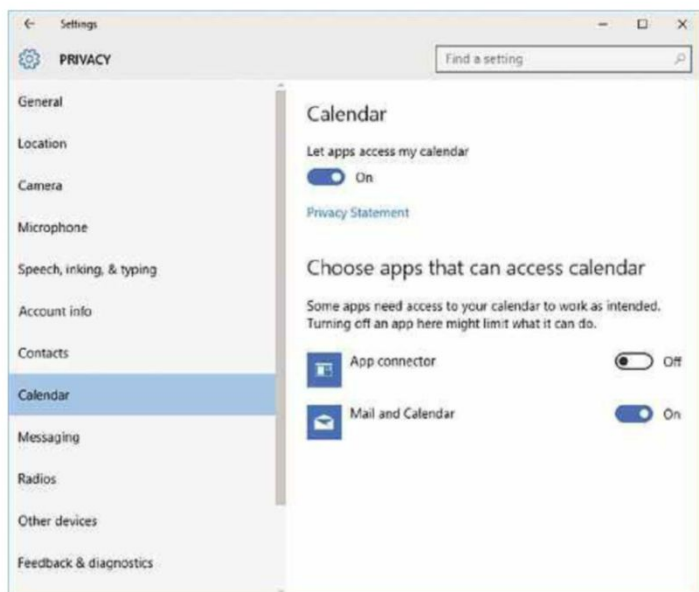
Systems made by Lenovo, Dell, Acer and Toshiba all have web locations where they list equipment that they've made that is supported by Windows 10. If you don't see your machine on the list, then I'd be prepared for disappointment. A quick trip there might prevent lots of problems and save you tons of time, because even if Windows 10 is free, that doesn't guarantee it will work on your computer.

6. More Privacy

Privacy has become something of a hot potato for Microsoft, since it started introducing features like Cortana and entirely altered the way it tracks customers with an 'Advertising ID'. Technically, that last feature was introduced with Windows 8, but relatively few people knew about it, until someone decided to find out exactly what information Windows 10 was phoning home.

There is a fine irony to all this, because previously Microsoft ran a lengthy ad campaign critical of Google ("You've been Scroogled"), and now it's doing exactly the same, if not arguably worse.

Microsoft's defence is that you can turn many of these privacy features to not allow this information to be used, though it will damage the usefulness of Cortana, if she's not allowed to gather



“ What Microsoft wants is in its best interest, and not necessarily identical to the needs of its customer base ”

intelligence from your email, contacts and calendar. However, in the recent November upgrade, Microsoft accidentally reset all these settings to the 'on' position, and it was forced to patch that error and retrieve users' preferred settings from the cloud, where it keeps them safe for (or from) you.

Those who find Microsoft's attitude to personal privacy concerning won't be inspired by a service that it added recently called DiagTrack (Diagnostics Tracking Service). Analysis of this code revealed that it's a spyware tool devised by Microsoft to grab your name; email address; preferences and interests; browsing, search and file history; and phone call and SMS data.

When this became common knowledge and people began disabling it, Microsoft responded by removing it – before renaming it and then reinstalling it.

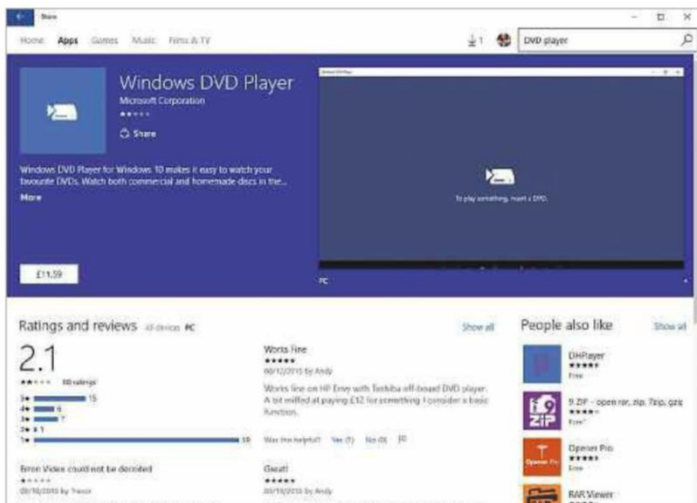
If you'd like more control over your personal data, then stick with Windows 7, because whatever Microsoft says, it's playing the same game as Google and Apple as far as your personal information is concerned.

7. The Media Center

When Media Center first appeared in Windows XP MCE, I thought it was one of the slickest interfaces I'd ever seen on a computer. However, it remained largely unchanged over its entire lifespan, because according to Microsoft's data, very few people actually used it.

In 2009, they took the people responsible (or is that 'person'?) and put them to do something else but only ended the availability of the application in Windows 10 this year. Technically, it could be got with XP MCE (Media Center Edition), Windows Vista Home Premium and Ultimate editions, and through an add-on pack to Windows 7 and 8.

If you use this tool to manage your media playback, then you need to either find something else, like Plex, or stay with a version of Windows that supports it.



What's extra annoying about this change is that while better media management tools existed for the PC, this one was designed to specifically work with the Xbox 360 – something it did rather well.

One extra point about Media Center that you need to be aware of is that should you have a system with it on and convert that to Windows 10, then Microsoft will kindly delete it for you from the resulting system. But one step better than that, should you decide you want to regress back to Windows 7 in the 30 days that you're allowed, Windows 7 will come back but Media Center definitely won't.

Those thinking that they can find a version of this software that will install on Windows 10 will be disappointed, as it appears Microsoft has seen that possibility coming and it will not install.

Those few people who like Media Center need to accept that they'll be sticking with a version of Windows prior to version 10.

8. DVD Playback

Microsoft added the ability to play DVD media a long time ago, but for whatever reason (licence costs?), it decided to remove it from Windows 10. And as if to add insult to injury, it pushed that functionality into an official app that costs you £11.59 to return DVD playing to the system. I'm not sure why anyone would pay this, given that you can install programs like VLC that do it for free.

Unlike some of the other things mentioned here, this isn't a deal-breaker; it's just another job you'll need to do to your upgraded system to make it work as well as the previous one.

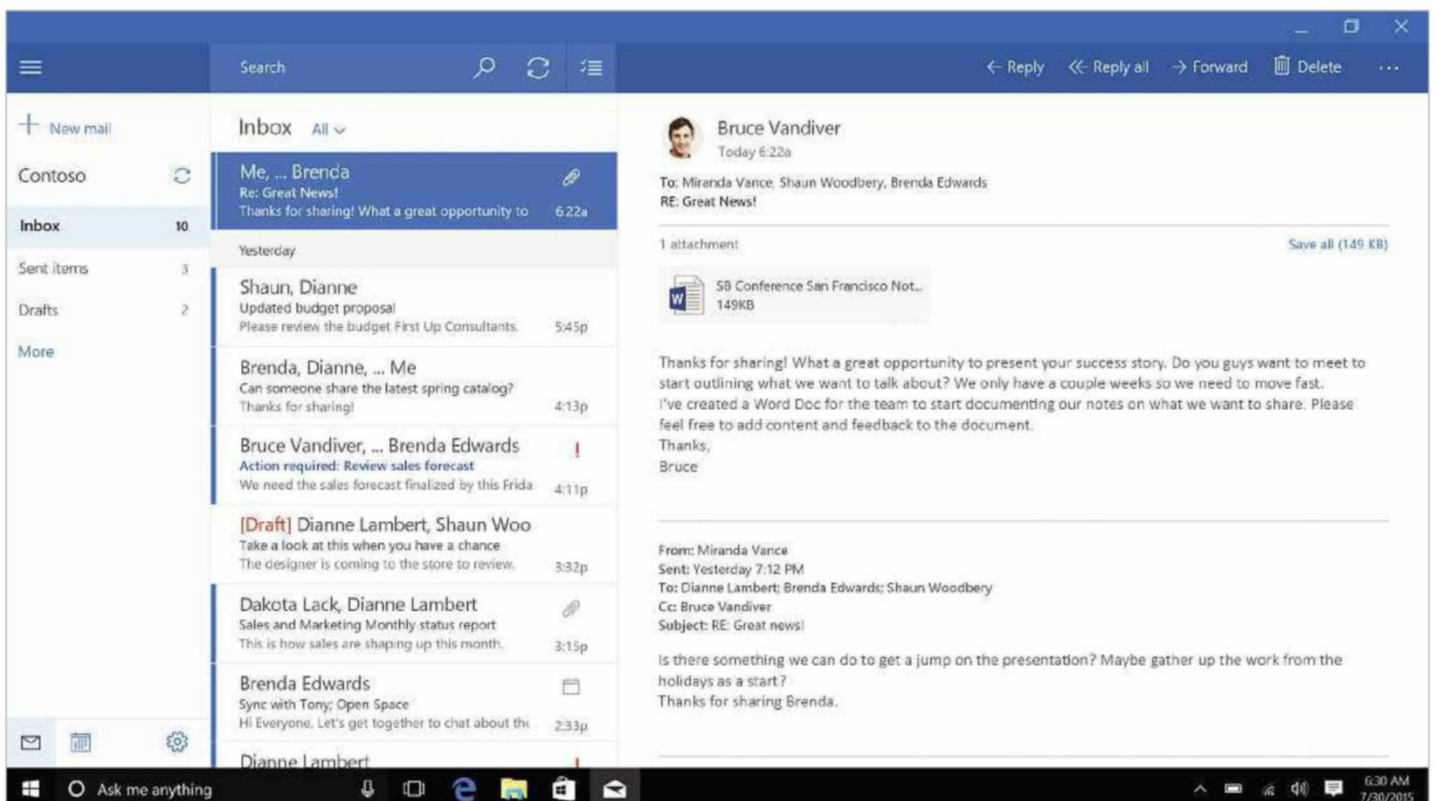
9. Regressive Apps

Many of you grew up with Windows, so you generally expect each new release to be better and all the apps that come with it to be superior or at least identical feature-wise to the ones that came before. However, with Windows 10, that notion seems to have been stood on its head to a degree, because some of the critical apps that come with Windows 10 aren't actually as good as the previous versions or, even more disturbingly, the ones that are currently on Windows Phone.

The one that has got people most perturbed is OneDrive, where some really powerful options that Windows 8 introduced have been unceremoniously junked.

Under Windows 8, it was possible to selectively sync files in a way that all machines that shared the same Microsoft accounts could see all the files, but you could control exactly what files lived on multiple machines. In this way, you didn't overload a machine with limited storage (like the original Surface), yet you could edit some files on one drive that would be synced back to your desktop machine.

OneDrive in Windows 10 doesn't work like that. It's regressed to a former functionality, where you sync specific files and folders without the 'placemaker' option of seeing everything stored on the cloud account.



This is much less useful, although it does avoid the scenario where you get on a plane thinking you've got a file, only to find out that you haven't locally synced it.

OneDrive is an problem, and so are some of the other critical apps, including the very poor Mail app and Microsoft's new browser, Edge, which doesn't have any plug-in support.

The Mail app is especially bad, considering that this universal app doesn't even contain some of the features of its phone cousin.

That we've got so far down the line with Windows 10 and these things are still a problem is a concern, and it makes this writer wonder exactly how many people are working on the standard app selection for this to be the case.

Microsoft has promised to being add-ons to Edge in 2016, and to continually improve the other apps, but at this time they're not a compelling reason to move to this OS or the Universal App model.

10. Windows 10 Is Unfinished

As I write about these things I have a machine with Windows 10 on it that's part of the Insider Project, and it gets all the patches ahead of when they're released into the mainstream. And since July, there have been a continuous stream of patches.

Some add features that are missing, others fix problems, and some create totally new problems. The overall impression is a 'work in progress', rather than a finished and polished product for sale.

Going back to the initial release, it's quite worrying to consider what condition it was in when Microsoft launched it. Today, it's more stable, has more features and some of the default apps are better, but it's far from finished.

There are still errors that I noticed the first time I ever used it that remain, either because they're not considered a high priority or there are so many of them that they're way down the fix list.

If customers were paying for Windows 10, they'd probably be causing more of a stink over some problems, but because it's free, they seem to be getting a pass for now. But in about seven months from now, Microsoft will be asking for money for Windows 10, and at the current rate of development, it still won't be completed to the level that Windows 7 is, and it may never be that polished.

If I wanted to see the development of an operating system slice by slice, I'd opt into a Linux distro that issues nightly compiles. This is 'Windows', and it's meant to launch mostly



working, and then be all there when the first service pack arrives. Windows 10 has had its first major upgrade already, and it isn't close to being a unified and complete OS.

Conversely, Windows 7 is as good as it's ever going to get, and that's substantially more polished than Windows 10 is at this time.

Final Thoughts

Reading the thoughts of another writer in Micro Mart recently, I don't really see that upgrading just because Microsoft wants us to do that is actually any sort of justification. It's a business, not a person we're trying to please. What Microsoft wants is in its best interest, and not necessarily identical to the needs of its customer base.

Like a shark always moving forward in water to survive, Microsoft must convince us to buy Windows, Office and whatever services it has to remain in business.

It's taking a massive gamble that giving Windows away for the first time ever won't just convince us all that operating systems should be free, like Android, and call time on the company as a commercial entity.

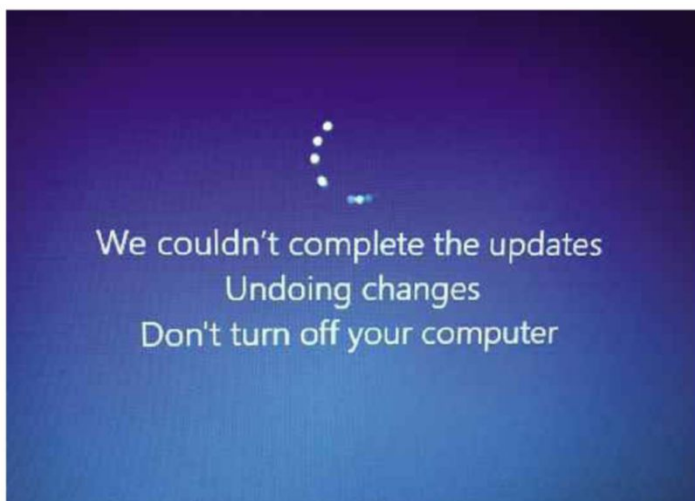
Did its users want activation or features removing, Bob or Bing? No, they didn't, and we have only Microsoft's assertion that Windows 10 is the future – something it said about Windows 8.x, which it subsequently retracted.

While it launches its products in the hope we'll like them, there isn't any loyalty program we're all invested that make it compulsory to go along with Windows 10 or anything else it makes.

Because of that conflict of interest, and the cost and time implications of transition, this is a choice that every Windows 7 or 8 user needs to make for themselves. And they don't really need Microsoft sat on their shoulder like the demonic offspring of Clippy asking every five seconds 'Are we there yet'? Or 'I can see you're using Windows 7. Would you like me to screw that up for you?'

We each can either see the value of Microsoft's proposition or we can't. Going along with it for any other reason than it's decided it's right for us is a ludicrous idea, however much prodding and pushing Microsoft tries.

Next week, I'll send the negative thinker away, and come up with some good reasons why you should upgrade, other than how much Microsoft badly wants it. If you can resist the temptation to upgrade in the meantime, that would be helpful. [mm](#)



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Skype, And The Best Alternatives

We take a look at the best communication software around that can keep you in touch with friends and family

It may be a small world, as the saying goes, but keeping in touch isn't always easy. If you've got friends or family abroad, or just far enough away that it can be hard to keep in touch without ramping up your phone bill or draining your monthly minutes. It can be difficult, or at the very least, expensive to chat for a while. If you're running a business and have to watch that bottom line, it can also be costly.

Luckily, there are solutions to this, and thanks to the internet, VoIP (Voice over Internet Protocol) and some very useful software, it's not only possible to stay in touch – no matter the distance – you can also see each other, as well as utilise special features to augment your communication. Even better, a lot of this software allows this free, without even a one-off payment for the program itself.

Of course, most computer users are aware of this use for the internet, after all, social networking and communication is one of the

major uses for computers in the home, but as always, there's more to this than the well-known options.

Most people are aware of Skype. Now owned by Microsoft, it is the household name in VoIP and has become the *de facto* cross-platform standard for internet communication. Certainly as far as home users are concerned. Thanks to Microsoft implementing it with Windows, it's also more widespread than ever now. Consequently, just as many may never bother leaving internet Explorer as it's already readily available on their PC, many don't know about, or look, for alternatives to Skype.

This is a shame as there are plenty of options, with many offering a totally different feature set to Skype, possibly features that may suit these users better. So, we're going to take a look at some of the best communication tools out there in order to give you a greater understand of what's available and to hopefully broaden your horizons.

SKYPE, AND THE BEST ALTERNATIVES



▲ Skype

Skype

www.skype.com

We'll start with the most popular option. As we've already said, this is a program used by millions to communicate around the world. Skype has risen to the top thanks to being exactly what people wanted – a way to talk without your time costing a fortune. Skype made it possible to talk to anyone, anywhere in either voice or video chat. It did this at a time where VoIP was still relatively unknown by many, and this kind of internet communication wasn't all that user friendly. Video chat had existed for a long time prior, but Skype made it mainstream and shunted it into the public consciousness. It was one of the first genuinely easy to use options, approachable by users of all abilities.

Skype's features have evolved, but the program has remained straightforward. Alongside the standard voice and video calls, Skype allows for conference calls, file transfers, text chat, calls from PC to mobile and vice versa. It also has a premium option giving you a Skype account via a dedicated VoIP phone – No PC or smartphone required.

While Skype's move to Microsoft allowed it to reach new markets, such as gamers, thanks to its incorporation onto the Xbox, it's the simple interface that means it's likely going to be the favourite of many for a long time to come.

Viber

www.viber.com

A major competitor to Skype and one that's hugely popular, despite still missing out on the crown. Viber is a more smartphone-focused app, and it offers totally free VoIP calls, as well as text and picture messaging. This bypasses your usual tariff limitations as it uses your data connection, not calls, and it works in any country in the world. Standard calls through Viber will still use your minutes, of course, and you can only get free calls when calling another Viber device. This is pretty much the same as any other, similar VoIP app.

Like Skype, Viber is available for various devices, including Windows, iOS, Windows Phone, Android, Blackberry and more. It boasts "Best-Quality HD voice calls," video calls, as well as a full chat application with support for photos and stickers. There's also the option to sync your account and setup between multiple devices, and the app can access your address book to automatically populate its own caller list, making it easy to pick up and use whatever device you have.

A neat extra feature is the ability to transfer an ongoing call between devices. This is very useful if you're on the go with a Viber call on your phone, and during the call you get home and want to continue from your laptop, where you can switch to your wi-fi network too. You can also use the public chat function, which lets you view public conversations. It's an odd feature, but it advertised as being able to eavesdrop on celebrities, so if that's interesting to you, it may be worth a punt.

FaceTime

www.apple.com/au/ios/facetime

Alongside Viber, Apple's FaceTime is the other big alternative, although it's only available for users of Apple's devices, which limits its scope somewhat. Despite this, FaceTime is very popular and embraces Apple's love of delivering polished, stand out services that offer streamlined and simple functions.

FaceTime allows for video chat to other FaceTime users for free and is available over any wi-fi, internet-connected network. The video chat is amongst the best around, with great quality video and unparalleled ease of use. 720P HD video is also supported, although this availability is limited to more up to date devices.

FaceTime is far more simplistic than most apps featured here, but few handle this core task quite as well, and if you've got a compatible Apple device, this is probably going to be your chat tool of choice.

Google Hangouts

hangouts.google.com

Hangouts is Google's answer to Skype and others: a free chat service that functions via a web portal instead of a downloadable app. After simply navigating to Google Hangouts you can invite people to chat using the simple interface which, being Google, is populated from your Google account.

Hangouts supports text and video chat, augmented by emoji, picture and GIFs, and you can create, or take part in a chat group of up to 100 people. This chatroom size is limited to 10 for a group video chat, but it's still very useful, especially for small businesses in need of a cheap conference tool.



▲ Viber



▲ FaceTime



▲ Google Hangouts



▲ ICQ

Google Hangouts also lets you synchronise your sessions across devices, so you can carry on a conversation from another device if you need to. Hangouts can be broadcast publicly too, allowing you to host your own public forum or stream. These can be recorded and added to YouTube, making it a great social and community tool.

ICQ

www.icq.com

Anyone using the internet in the 90s will probably fondly remember one of the first major chat programs around. ICQ, then owned by Mirabilis and bought by AOL, was one of the most popular chat applications of the time and its familiar “eh-oh” sounds and simple, but powerful, interface made it an obvious choice for anyone wanting to stay in touch.

It's now operated by Digital Sky Technologies, but ICQ still offers a full-fledged chat feature set, albeit in a much more crowded market. As this market has changed to offer staple text and video chat, so too has ICQ, and it features robust text chat functions, complete with emoji, stickers and so on, as well as free voice and video calls.

ICQ was one of the first apps to make file sharing easy during a chat session, and it continues to offer this, along with various themes and the ability to connect the app to your social networking account.

Voxox

www.voxox.com

This is an app for smartphones that sticks to the basics of chatting with others for free. Like competing services, such as Viber, Voxox offers totally free calls to other Voxox users, with unlimited talk time, and this is accompanied by free SMS and text chat. You can also call others without Voxox, but this isn't free. It does cost a reduced rate, though.

Other features of the app include photo sharing, fax and the ability to translate text message into 60 languages. There's a location sharing feature, which has Google Maps integration, and you can access a free, US phone number with each account. The program can also transcribe voice mail messages for your perusal, and you can forward other phone calls directly to Voxox.



Line

line.me/en

This is another app that takes a similar approach to the likes of Viber, offering the usual free calls to other users of the app, but it also features a paid-for ability to call landlines and mobiles, even from a PC. This service is charged either via a monthly subscription, or a pay-as-you-go alternative, so it's fairly flexible.

A big focus of Line is with social networking, and alongside the standard chat, the app supports chat rooms, as well as games, stickers and a user profile that others can see. It initially appears as a very casual application, but it does have business uses, not least for the ability to call others from your computer, and it's available on multiple devices.

Jitsi

jitsi.org

Jitsi is an open source communication app that offers audio and video calls to other users of the program. Initially, the app was limited to PC use, but an Android version can now be downloaded. The features of the app are fairly simplistic when compared to others, but it does have its share of interesting tools, including the ability

► Voxox



▲ Line



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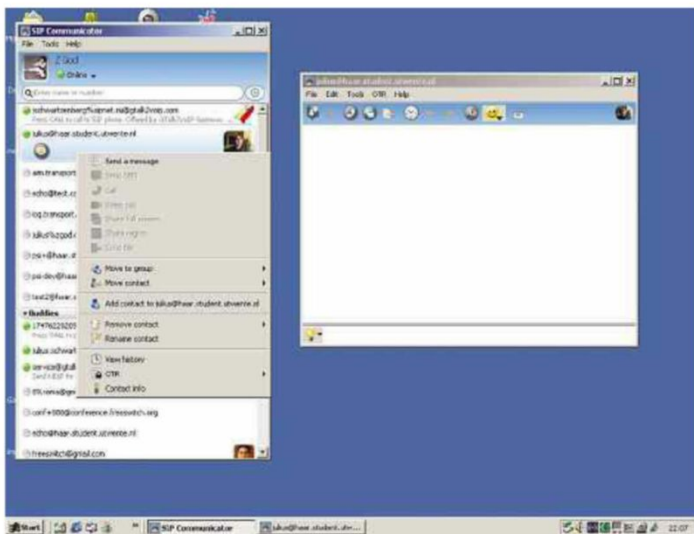
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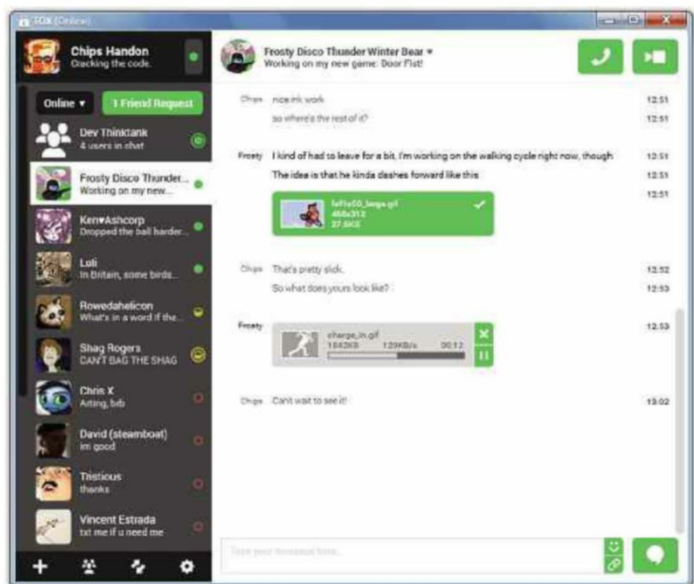


Business Direct

PHILIPS



▲ Jitsi



▲ Tox

to share your screen with others and encrypt calls. You can even record calls should you wish to. There's a noise suppression and echo cancelling ability, as well as basic file sharing.

Tox

tox.chat

With the increasing growth of data sharing and more open applications being made available online, many users don't feel as secure as they could be using services like Skype (especially after its purchase by Microsoft) and so look for secure alternatives. This is where an app like Tox comes in. Tox is a very secure chat tool that offers voice and video calls to other Tox users, as well as the usual assortment of social networking features like file sharing, emoji and so on. There's nothing feature-wise that stands out here, but it's all solid and works well.

The major difference is Tox's use of encryption to secure your communications. Indeed, this is what Tox revolves around, and although the core features are fairly simple, they're wrapped up in rock-solid protection, ensuring no one will intrude or spy on your conversations.

Slack

slack.com

This is a different application to the others on this list, as it's not actually a chat application as such. Instead, Slack is a hub of sorts that gathers together a range of third party apps into a suite of tools. This open approach means you get a far more varied and feature-rich experience, one that makes use of some of the best tools around.

The program is able to make use of Google's apps, such as Hangouts for voice and video chat, Google Drive for sharing, as well as other services, such as DropBox, DataDog and GoSquared. It can also search your conversations for specific words. It's an interesting approach to the market, and thanks to the modular use of other apps, it's one of the more flexible around.

WeChat

web.wechat.com

Possibly the most social media-centric app in this selection, WeChat is a true chat app for the Facebook generation, and it incorporates features that integrate it with the most popular social media outlets.

Alongside voice, video and text chat – which includes group chat – it can be used to share photos and videos directly to your social networking apps, including Facebook. You can also use the 'Shake' function to find people in close proximity to chat with. An odd feature is the 'Drift Bottle,' which let's you send a message that drifts around in the ether until someone picks it up, just like a message in a bottle.

Vsee

vsee.com

Vsee is an app that's more focused on group communication, being used primarily in medicine, but it's still very useful for standard home use as it possesses some great features that help it compete with other, more popular options. For one, it offers the usual unlimited calls, both single and group, as well as file sharing and instant messaging.



▲ Slack

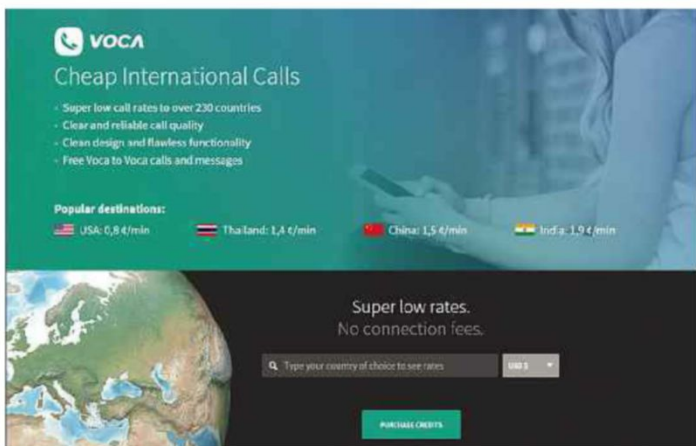


▲ WeChat

SKYPE, AND THE BEST ALTERNATIVES



▲ VSee



▲ Voca

Of particular note is VSee's apparent use of half the bandwidth of Skype, meaning you'll use less data per call. It also supports 720p HD calls, and you can share your screen to others. This sharing is limited, though, and you can only do so once per day for free. To share more than that you'll need to subscribe to the paid service. It's cheap, though, costing around \$10 a month. Students with either a .id, or .edu email account can get this VSee Plus account for free.

Voca getvoca.com

This chat application is focused on international calls and keeping in touch with others abroad. The reason for this is the program's offer of very cheap international calls via VoIP. Calls are also encrypted, for reliable privacy.

Calls to others are charged via a credit-based scheme in which you purchase time prior to use, and the time left is shown during your calls, so you're always aware of how much you have left. Of course, if you and your contact both have Voca installed, calls are free.

Voca's interface is very simple and very easy to use, and this is one of the program's best points. It's very well designed and is perfect for users of all abilities, even those totally new to computers, software, or even chat applications.

Oovoo www.oovoo.com

Oovoo, like WeChat is a very social media-focused app, and it offers a range of features that compliment the video chat, which is of very high quality. The tool can host conference calls and text messages and group chats can include up to 12 people at any one time. Screen sharing is also supported, as well as file sharing, and

you can record video and upload it to YouTube with a single click. Of particular note is the ability to connect to friends and family via social media, even if they don't use Oovoo, as calls from the app can be picked up on Facebook.

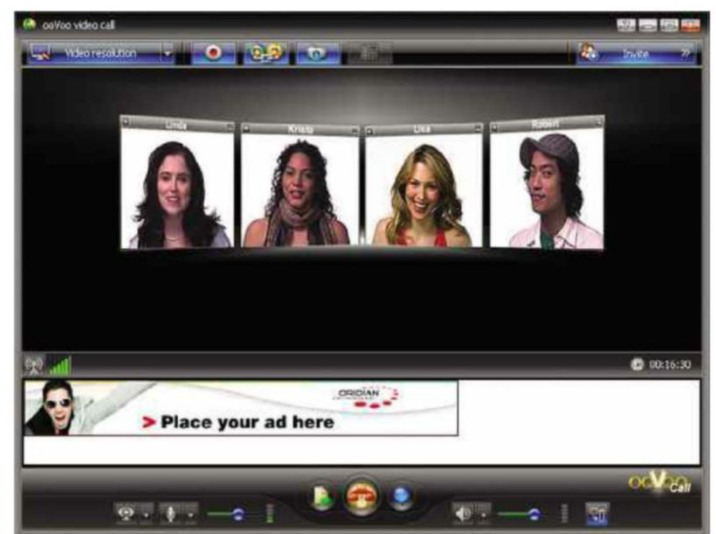
The free version of Oovoo comes with ads, sadly, but the paid service removes these and also supplies online storage for up to 1,000 minutes and lets you call landline or mobile phone numbers.

GoToMeeting www.gotomeeting.com

Our final option is the popular GoToMeeting. This is a very powerful video conferencing tool that, while not free, is probably the best overall option in terms of ability and quality. This isn't surprising, as it comes from Citrix, an expert in remote communications.

GoToMeeting is designed for business use, so it's not as suited to home use, not least due to the cost, but even in the home it could be very useful. It allows for possibly the highest quality video calls around, with up to 25 able to attend a group sessions at any one time. The video and audio are true HD quality, and alongside the video calls you can share files, screens and even pass control of a system to another user in the group, making it ideal for technical support, or helping a friend. There are tools to highlight parts of a screen, perfect for presentations, and users can host seminars and training sessions thanks to the well-rounded features.

Payment plans aren't cheap, starting at around \$50 per month, but GoToMeeting is a very powerful communication tool, and it's also very secure, which is even more important if you're using it as part of a business or educational tool. [mm](#)



▲ Oovoo



▲ GoToMeeting

Your Letters

The Slippery Slope

Over the past week I have been watching *Fake* on BBC daytime television and have come to the conclusion that internet shopping is a very slippery slope.

Amazon, Ebay, Gumtree and the rest of that ilk seem to be determined to let their sellers advertise and sell anything as long as it makes them a profit. Over the last five days fake Brake Shoes, Car Tyres, Carbon Monoxide detectors, Razors, Children's Clothes, Children's Toys, Children's Night Lights, Sweets, Food and LEDs have been found to be fake. All these are a serious danger to you and your family.

You name it and some Dodgy Chinese Manufacturer will make it for a price and ship it to the UK so an internet entrepreneur or Organised Crime gang can sell it for just a few pounds or pence below the retail price. A bargain, with your life at stake. These fakes all come with all the relevant safety marks. These safety marks mean absolutely nothing and the seller's don't give a S##t as long as he makes a profit.

This lot make Del Boy look like a saint.

It's no good Amazon, Ebay, Gumtree, and the rest of these sites saying 'how can we police all of the items sold?' They are making such a profit a few pounds to check up on these regular sellers should not break their bank account. As long as this trade in fakes continues the less the public will trust these sites the public will stay away from these and the reputable companies who are not out to defraud us. Then it's back to the High Street for all of us as the online sellers will not be trusted. One famous High Street store sold real fur from the Raccoon Dog as fake because real fur is cheaper than fake fur, if they can be tricked what chance do we have?

It's up to the government to stop this trade in fakes and protect the people of this country from the fakers Chinese or otherwise. The last thing I want is some frugal motorist running into the back of me with dodgy brakes and tyres which he bought from the internet.

David Shaw

Ad Blocking

I take your point about adblocking and I will stop blocking ads in Yahoo just as soon as Yahoo stops sending "Sponsored" Automatic Mail - SpAM, for short, to every one of my mail folders, including Spam and Trash, every time I log into my email. Fortunately, I've discovered a blocker which filters it out, although I only have it enabled in Firefox, and not in IE which I sometimes use. I don't know if it's due to the filter, but Yahoo takes longer to load than it's taken to complete the Chilcot Enquiry.

From the feedback on the hard-to-locate Yahoo Feedback Page, I get the impression that users don't object to side ads. It's the sponsored Spam that is the last straw. Yahoo's response, when they deign to offer one, is "Pay up or put up with it." What Yahoo don't seem to realise is that most of us aren't going to read these messages, so their advertising potential is low, if not zero.

Free websites need advertisers to fund them. Advertisers need site users to sell to. I think it's called symbiosis. Advertisers want to maximise the potential audience for their ads. Alienating that audience to the extent that they either use adblockers or move away altogether is not in the advertisers' interests, and that's not in the site's interest. Is it, Yahoo?

Dave Williams

App Inventor 2

I always look forward to my copy of Micro Mart arriving through the door, and never more so than when the series of App Inventor tutorials appeared. As someone in their 70's who's only experience of programming was self taught, firstly in Motorola 6800 machine code, then Assembler language and subsequently in GW BASIC some years ago, this was always going to be an interesting challenge for me. With BASIC I learned how to use one instruction, then another and eventually use them to form a useful program.

After the first 4 or 5 parts I began to think that the only thing I was learning, was how to fit jigsaw pieces together. The purpose of each piece was not always obvious. The Ai2 series of tutorials were fully working programs or Apps from the word go,

one per issue, and at first I felt I was no wiser when it came to knowing how to begin to write one myself. As I progressed I began to realise I was slowly learning how to put together routines that could be used or modified and built upon. As the author said, you need to think of ways you can develop the blocks you had so far constructed. I think, like most programming languages, the best way to learn is to make a mistake, and then try to find out why it went wrong. It makes you stop and think about what each step is trying to achieve.

I've got some great little Apps on my phone now, and some have been personalised or modified to suit my own requirements. I'm sorry to see the series end, perhaps some more in the future?

Fred Burnett

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How 3D-printed rats could offer schools a vegetarian dissection

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A fresh take on technology

Remembering... ATA/IDE

Once upon a time, hard drives connected to PCs using a long ribbon...

In 1956, IBM shipped the very first hard drive in its RAMAC 305 system. This was an incredible advancement in technology that delivered a whopping 5MB across two fridge-sized units that weighed nearly 30 stone each and came in at a cost of \$10,000 per megabyte.

Of course, things have improved since those early days and what we have now is probably well beyond the imagination of those who first started work on these devices back in the mid-50s.

To get where we are now, though, took some time. Before 1985, most IBM PCs used the common Winchester hard drive controllers, but then late in 1985, Western Digital came up with something really quite ingenious: the 40-pin IDE (Intelligent/Integrated Drive Electronics).

IDE was the common name for the actual interface that was built into the hard drive control board itself. However, it was correctly known by a variety of other names such as ATA, ATA/ATAPI, EIDE, ATA-2, Fast ATA, ATA-3, Ultra ATA, Ultra DMA and so on. Essentially, they all meant the same level of technology, which was a cleverly designed 40-pin ribbon that attached to the drive and motherboard or some other ISA-based controller board.

I'm sure most of us can remember the blue, black or grey coloured plastic end, with the little ridge at the top to denote which way

around the cable went into the socket. The trailing ribbons, which we tried in vain to cable tie to the inner chassis of our PC cases to make the system look as neat as possible. And let's not forget those odd cables where you needed to reverse one of the connections for the hard drive, then reverse it again for the CD-ROM drive, resulting in a twisted cable that would end up stuffed behind the drive in case anyone saw it. Happy memories indeed.

Its History

Although Western Digital came out with the IDE/ATA interface in 1985, it wasn't until several years that it actually became a mainstream connection for a hard drive.

The emerging home PC market was what made the connection and interface so popular, being cheaper than SCSI despite having lower read and write speeds. Most home users, however, didn't care too much about having a RAID setup; home PCs were sold as simple devices with which users could word process, do a few spreadsheets and play a game or two. IDE/ATA therefore was ideal in keeping the cost to the user low enough to allow the market to flourish.

As time moved on, Western Digital started to produce hard drives itself, rather than just being a controller electronics manufacturer, and with other hard drive manufacturers such as Seagate now adopting IDE/ATA, there was a need to push the technology.

Did You Know?

- The first IDE/ATA drive designed for a laptop was the Prairie Tek 220, a 20MB two-platter 2.5" drive.
- The first IDE 3.5" drive from Western Digital was the Caviar model.
- ATA-2 was commonly known as EIDE and had transfer speeds of 16MB/s, with a maximum capacity of 8GB.
- ATA-6 or UDMA/100 was the last Parallel ATA interface and could theoretically achieve a transfer speed of 100MB/s.

Soon enough, an 80-pin cable was introduced to help improve bandwidth and cut out crosstalk. This boosted the throughput of an ATA drive from 16MB/s to 33MB/s and beyond when the UDMA and ATA-4 standard was introduced.

With the release of Serial ATA in 2003, the older ATA or Parallel ATA, started to decline rapidly. SATA offer a better bandwidth, hot plugging and less space used by the actual cable itself.

The Good

Finally a better connection to a hard drive other than the older hardcards that were mounted directly to an ISA controller.

The Bad

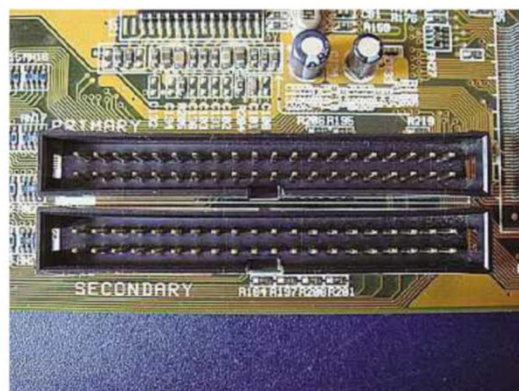
Finding the right cable length. Confusing cables with no indication of pin one or the plastic lump. And those cables where the connections were often reversed half-way down – usually cheap ones.

Conclusion

Where would we be without IDE/ATA? Quite probably having to mount a heavy hard drive onto a card that's balanced precariously in an ISA slot. That or we'd all be using SCSI connections. [mm](#)



▲ The IDE/ATA cable for a hard drive or optical drive. How many do you still have?



▲ A long lost sight on modern motherboards

Component Watch

What to look for in 2016

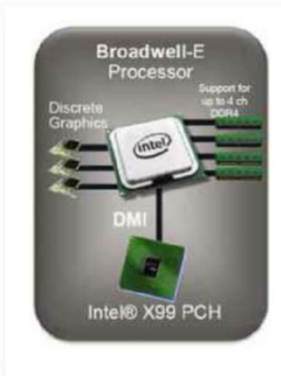
We're setting our 'Watch' forward a little this week...

Although it's January 2016 for you, we're currently wrapping up this issue of *Micro Mart* just before Christmas. Although we usually use Component Watch to bring you the best deals we can find, it's safe to say that a column three weeks out of date would probably be of very little use when it comes to striking while the discount iron is hot.

That's why, for this week only, we're using Component Watch to take a look at some of the hardware you can look forward to being released in 2016.

1. Broadwell-E

Intel's continued dominance of the desktop CPU market means it can basically do whatever it wants... And it's fair to say that it'll be doing exactly that in 2016. A leaked roadmap for the year suggests that come Q2 2016 you'll be able to pick up the Broadwell-E Core i7-6950X, which is a 10-core monster of a CPU that supports 20-thread Hyper-Threading and has 25MB of cache. It seems unlikely most people will be in the market for a beast of CPU like that today, or at any time in the immediate future, but it's a fun look at how desktop computing might be a few generations down the line.



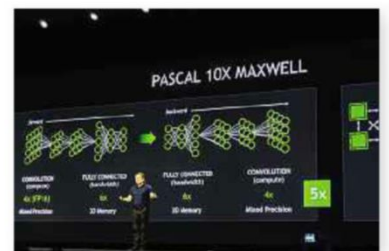
2. Oculus Rift

It's been a while now since the Oculus Rift burst onto the scene with its \$2m-raising Kickstarter campaign. Yet, in that time, rather than the tales of woe and underperformance some suspect would come in its wake, everyone who's tried the ground-breaking VR tech has come away filled with praise. In 2016 the consumer model will finally go on sale, apparently shipping in Q1 2016 – we'd guess March. If it is going to hit that target, it will come with a retail price around \$300, and we'd guess the UK price will be close to that in pounds thanks to the vagaries that usually afflict overseas pricing. Regardless of price, though, you can be sure it's going to be one of 2016's biggest gaming stories.



3. Nvidia Pascal GPUs

Coming at some point in 2016 (probably not before the middle of the year) the 1000-series Nvidia Pascal line of GPUs will replace the 900-series Maxwell GPUs released in September 2014. Features including full support for DirectX 12.0 and OpenGL 4.5, four memory stacks, a 16nm process GPU, support for the NVLink high-speed bus (offering bandwidth of between 80 & 200 GB/s and unified memory, so the CPU and GPU can both access the graphics card's memory directly. It's already being tested internally and looks to be a huge leap forward, so if you're thinking of dropping a lot on a card it might be worth waiting just a few more months...



4. Radeon Arctic Islands

In similar territory, 2016 should also see the launch of the new Radeon Rx 400 series cards, which will have a 14nm manufacturing process, compatibility with HDMI 2.0a and DisplayPort 1.3, and full support for DirectX 12.1, OpenCL 2.1 and OpenGL 4.5. They aren't entering production for a short while yet, but as soon as they do they should come to market fairly quickly. Again, we'd expect to see the first examples around the middle of the year.



5. AMD Zen CPU

Finally, 2016 could be the year that AMD's desktop chip fightback happens. Rumoured since as far back as May, and currently pegged for the back half of 2016, the x86 Zen CPUs are supposed to feature a completely new high-performance core, simultaneous multithreading (a technology similar to Hyper-Threading), low-latency cache and new energy efficient FinFET design. They'll run on a new AM4 platform and support DDR4, putting them in direct competition with Intel's latest chips. It's been a long time coming, but if AMD can pull it off the desktop chip market might finally get interesting again. Fingers crossed.





Micro Mart's News Review Of 2015

January

2 015 started, as ever, with CES, and Sony went old school with a \$1,200 high-end Walkman (yes, really) while smartphones, 4K TVs and wearables once again dominated proceedings.

Yahoo ended the month by announcing that it was to spin off its stake in Chinese e-commerce site Alibaba and hand the business to its stakeholders (an announcement that we'll come back to later). In less investor-y news, a sealed NES cartridge of the

game *Stadium Events* managed to sell on eBay for a ridiculous \$35,100. Sticking with the gaming theme, production of the Spectrum Vega began in earnest in January, giving retro fans the look and feel of the old machine. It's not the real thing, of course, but a fine project nonetheless.

And back to business as, towards the end of the month, O2 and Three announced plans for a mighty merger, plans that are still being picked over as we write this.



February

The Raspberry Pi has had a very productive year, one that started with the launch of the Raspberry Pi 2. Selling for just \$35, this model would, of course, go on to be highly successful in its own right, before the \$5 Raspberry Pi Zero landed (to the lucky few to get their hands on one) in November.

More merger news landed in February with the announcement that BT was going to acquire mobile operator EE for the not-insubstantial sum of £12.5bn. The deal was also approved later in the year by the Competition and Markets Authority.

As for big occasions in February, YouTube celebrated its tenth birthday on Valentine's Day. Has it really been ten years? We feel old.

Finally, remember Superfish? Lenovo's pre-installed adware disaster brought the company all the wrong attention for all the wrong reasons. Superfish? More like, erm... Rubbishfish. Sorry.



If you're looking for carefully considered analysis of all the hot topics and debates of the past year... you're in the wrong place, frankly.

If however you want to read all about mammoth system builds, strange arrests from

across the pond and the odd bit of actual hard-core technology-based news items, then we may be of some help.

Yes, it's the annual Micro Mart Review of the Year! *cue drum roll, applause and a faint air of embarrassment all round...



March

E-sports came to London in March with the official opening of the UK's first dedicated e-sports arena, the Gfinity Arena. The purpose-built arena would have cost a fair bit of investment, but that's something that Bill Gates could handle easily. Bill, you see, was announced as the richest man in the world by *Forbes* magazine. For the 16th time. His net worth? It's around the \$79bn mark. Yikes.

Apple gets its first mention of the yearly round-up this month with the announcement of the long-awaited Apple Watch, probably most notable for having a particular design that would cost you £13,500 if you wanted to buy it. Other big product announcements for the month included BlackBerry's Leap phone, notable for proving that BlackBerry (at that time) had refused to give in to calls for a return to its physical keyboard roots.

In other news: the National Gallery banned selfie sticks, the BBC proudly announced its Micro Bits initiative – providing schools with coding devices as part of its Make It Digital project – and March would have also been the 20th anniversary of Microsoft Bob. Bless. Finally, March means BAFTA and, despite a lot of complaints about the game from players themselves, *Destiny* won the Best Game gong.



April

The world said goodbye to cloud gaming service OnLive in April as the company sold a bunch of patents to Sony. While the shutdown wasn't a huge surprise, given that OnLive wasn't exactly a rip-roaring success in the first place, it was nonetheless a pity that the service bit the dust.

Over at EE, the company issued its Power Bar portable charger to customers, which was a lovely thought – until it was forced to recall a batch of them after reports of them exploding. EE was also the first operator to launch WiFi Free Calling for the iPhone in April, providing mobile access even in areas of poor mobile coverage.

A US judge ruled that divorce papers could be sent by Facebook, a notebook that used to belong to Alan Turing sold at auction for over a million dollars, and a couple of men got into an actual fistfight over whether Android is better than Apple. Microsoft probably thinks it's the best, though, thanks to the reveal of HoloLens at its BUILD conference.

Like many other people around the world, I've so far resisted the urge to take up Microsoft on its free Windows 10 offer. Instead, I've been sticking with Windows 7, at least on the computer I use the most. I have actually installed it on my Macbook in Boot Camp, because I hardly ever use Windows on it.

I also have a slightly broken media centre PC kicking about that I might upgrade (if I can get it working), but that's only because it currently has Windows 8 on it. To be fair, it did show a performance improvement, compared to Windows 7, but I just couldn't stand the tiled interface at all.

Of course, Windows 10 is a far more sensible OS than 8, so what's stopping me from embracing it? Put simply, bugs. I know I'm going to upgrade eventually, but I'd rather wait until as many problems have been identified and eliminated as soon as possible. And having heard about some of the difficulties people have been having with this new software, I have a suspicion I'm going to end up having to do a fresh installation rather than an upgrade.

And that, as I'm sure you'll agree, is a job always best left for another day...

Anthony

Editor

Meanwhile... On The Internet...

As you are braving the second week of the new year, you may not have much sympathy for Team Meanwhile, which has endeavoured to put together this topical column a few days before it breaks for Christmas... Basically, we're the epitome of a first world problem (tinyurl.com/MMnet95a). Still, for you, we soldier on...

One story that's been moving at a speed that probably means nothing much will have changed by the time you read this, is the legal battle being fought in New Zealand over the extradition of the Megaupload main-man Kim Dotcom (tinyurl.com/MMnet95b). As we write, it's just been announced that the Kiwi courts have decided he should be sent to the US to face a litany of charges after a four-year will-he-won't-he legal too-and-fro that has had pretty much everything (and will probably be a Netflix mini-series at some point in the future). However, when, and if, Dotcom will ever get on a flight to face US justice (tinyurl.com/MMnet95c) is still very much in doubt. He still has avenues of appeal, which he seems intent on exploring to their fullest – at least according to a tweet from his legal representative, which is all we currently have to go on (tinyurl.com/MMnet95d) beyond Dotcom comments outside the court, that “this is not the last word on the matter”. And Dotcom still maintains his defence that Megaupload was, in essence, no different to other cloud storage services, meaning he is not liable for what users put there.

Dotcom's case is of interest for many reasons. First and, perhaps, foremost is the fact that Dotcom isn't from shy and retiring. He basks in the limelight and has knowingly self-promoted and kept a high profile throughout the proceedings (tinyurl.com/MMnet95e). The fact is, his lifestyle was newsworthy before New Zealand authorities raided his home mob-handed in 2012 (tinyurl.com/MMnet95f), seemingly at the beck-and-call of the the FBI, before being made to apologise over some of their actions (tinyurl.com/MMnet95g) while surveilling him. Indeed, New Zealand's Government Communications Security Bureau's involvement in the case (tinyurl.com/MMnet95h) became a story that quickly spiralled out to a wider debate about the country's monitoring of its own citizens (tinyurl.com/MMnet95i).

Ultimately, his case speaks to the intentions of the US government and just how far they're willing to go to protect copyright in the face of pressure from powerful lobby groups within the US (tinyurl.com/MMnet95j). It's well documented that Dotcom is no angel, but it's hard to argue that the raid – which involved paramilitary-style police with automatic weapons, helicopters and enough hardware to break Dotcom out of his mansion's safe-room – wasn't heavy handed. Indeed, Dotcom had allegedly spoken to police on the previous day, having welcomed them into his home, which exposes it as probably a little bit on the show-boaty side.

While Kim Dotcom likes to make sure his beefs with copyright holders are conducted as loudly as possible, Peter Sunde – he of Pirate Bay infamy, working under the moniker Brop – seems to be content to take a much more circumspect and thoughtful approach to making his points since he got out of jail (tinyurl.com/MMnet95k).

His latest project, the Kopimashin (tinyurl.com/MMnet95l), is a little Raspberry Pi-based device that Sunde has built for an art exhibit. Kopimashin really only has two jobs: to generate copies of Gnarl's Barkley's *Crazy* (which it can do roughly 100 times per second, before deleting each one immediately), and adding up the theoretical cost of those copies to its rights holder owner, Downtown Records/Warner Music, based on the scale those companies use to calculate their 'losses' from piracy (approximately \$1.25 per copy). It then displays the notional loss on a tiny LCD screen, chuntering on indefinitely until it is turned off. Sarcasm fans may like to know that notional loss amounts to something in the region of \$11 million per day.

According to Sunde, he wants “to show the absurdity on the process of putting a value to a copy”, before going on to note that “The machine is made to be very blunt and open about the fact that it's not a danger to any industry at all” (tinyurl.com/MMnet95m). Whether or not lawyers across the Atlantic agree with that sentiment, remains to be seen, however... We wouldn't be confident that they see things in quite the same way as Peter.

In the wake of the hullabaloo surrounding the release of *Star Wars: The Force Awakens* late last year, without doubt our favourite piece of parody has been the 'Emo Kylo Ren' Twitter account (@KyloR3n). Playing on the petulant nature of the character – and his penchant for wrecking things in a fit of rage – Emo Ren describes himself as a 'Ren's rights activist' and uses his 140-character diatribes to air his frustrations with his mother and father, high-school and the world in general.

While you are now probably well free of the hype and 'reveal-any-spoilers-and-we'll-come-get-you'-type threats we're still living under, we'll say no more on the matter and leave you to find out more for yourself.

To finish up, let's do another *Star Wars: The Force Awakens* story before we get back from our break and back to being a bit more topical next week...

There aren't many events these days that can have a noticeable effect on the internet; they truly have to be global phenomena, so initial hints that the release of the new movie caused a marked downturn in internet use around the world surely bodes well for its bid to become the biggest box office success of all time (tinyurl.com/MMnet95n).

.AVWhy?

Videos For Your Eyes...
Not Necessarily For Your Brain

We've given up on being up to date this week (the foibles of holiday deadlines have well and truly seen to that), so rather than expose you to the latest flash-in-the-pan viral video, we're going to refer back to one of Team Meanwhile's favourite internet things of recent years. Made in 2013 for YouTube's geek week, this return to the *Nightmare* dungeon is guaranteed to push nostalgia buttons for readers of a certain age (youtu.be/74r-Eblqt9s).



Caption Competition

"A Santa at NASA celebrates his coveted palindrome award"



What's Mr Claus up to here, we wonder? Let's see what you came up with:

- **Thomas Turnbull:** "Well, you don't think I spend all winter in Lapland do you?"
- **Thomas Turnbull:** "It a lot less work when I do the wish lists online and deliver through Amazon."
- **Sawboman:** "Thank you, reindeer, I'm off the M25 at last!"
- **EdP:** "The joy of being Santa in New Zealand's North Island, while his northern hemisphere brother works his butt off!"
- **BullStuff:** "Great! Amazon have 6x GT reindeer and a luxury new sledge in stock!"
- **doctoryorkie:** "This is how I spend the other 364 days of the year."
- **doctoryorkie:** "A Santa at NASA celebrates his coveted palindrome award."
- **The Duke:** "Santa enjoying his redundancy, now that Amazon has won Christmas."
- **Mad Malc is back:** "Those elves, switching my underarm deodorant for hair spray and putting super glue on the bottom of my laptop, not so much a reindeer party more like a stag do. This snow feels warm?"
- **Mad Malc is back:** "Santa loves watching his sleigh leave those North American Fighter jets standing on the Norad website."

Thanks for all your entries, and congratulations to our winner, doctoryorkie, who suggested, "A Santa at NASA celebrates his coveted palindrome award."

If you have something to say about the picture below, head to the 'Other Stuff' section of our forum (forum.micromart.co.uk), or email us your funnies via caption@micromart.co.uk, remembering to add the issue number to the email subject line.



May



Is there any better way of dealing with cheats than publicly shaming them within the game itself? The gamers of *Guild Wars 2* clearly didn't think so. Thus, when a hacker going by the character name JT DarkSide was stripped naked and forced to jump from a parapet to his death. The unique sentence was handed down by gamers themselves.

In America, a bank robber posted videos of his efforts online and was subsequently arrested for his crimes. The evidence was right there, after all. Also in the States, a sales executive filed a lawsuit against her company for firing her over claims she uninstalled an iPhone app that she was told to install to monitor her movements. Odd, that one.

Finally from across the pond, one Barack Obama joined Twitter in May, tweeting "Hello, Twitter! It's Barack. Really! Six years in, they're finally giving me my own account." We've read worse first efforts.

Back in the UK, we're sure we speak for horrified parents everywhere when retelling the story of 11-year-old Nick Wrinch, who spent £3,000 on buying credits via Google Play over a two-month period. Luckily for all involved, Google refunded the family but still... Yikes! A better way to spend £3,000 would surely have been to put it towards the £24,000 needed to buy a *Star Wars Battle Pod* arcade game, made for your home from Bandai Namco Entertainment. Just look at it. Beautiful.

June

Proving that the Americans don't have a monopoly on slightly outlandish stories, a Cambridge man set about building his own 16-bit, 45ft computer. In his lounge. For £20,000. Nicely done, Sir.

Warner Bros didn't have the best of months when it was forced to announce a recall on the latest in the *Batman Arkham* franchise. *Arkham Knight* was beset with problems for PC gamers, and this was an issue that just wasn't going to go away quickly and quietly. In the end, Warner Bros chose to offer full refunds for anyone who has purchased the game, as the studio admitted that some of the problems would simply never be resolved.

Disney gained headlines beyond *Star Wars* for banning selfie sticks from its global

theme parks, which begged the question: "Can't we just ban selfie sticks, full stop please?" Microsoft also had tongues wagging when it announced that its Xbox One console would be backwards compatible with a bunch of the older Xbox 360 titles, saying 'Yah-Boo' to Sony's PlayStation Now service.

To finish June, why not recall the school in Michigan that has used a Commodore Amiga system to control the air conditioning and heating for 19 public schools in the area since the 1980s? There's life in the old dog yet.



July

July was a big month for everyone in the UK as freephone 0800 and 0808 numbers sensibly became free on mobiles as well as landlines. The change has been a long time coming.

Microsoft found itself a new Groove in July with the rebranding of Xbox Music as Groove Music. Why? It said, "Groove describes what people feel and do with music." We wrote that it sounded dreadful back then. Our opinion hasn't changed.

Towards the end of July, Amazon launched its Prime Music service for UK users, which was a tasty addition for anyone already signed up to Prime. July was also a month for one of the bigger hacking

stories of the year (of which there were plenty) as Fiat Chrysler recalled more than 1.4 million Jeep, Dodge and Chrysler models because of a flaw in the entertainment system that meant the cars could be controlled by hackers.

And finally... a very clever man put a version of *Half-Life* onto an Android LG G Watch. Crazy days. Is that a more impressive achievement than Microsoft launching Windows 10 globally on 29th July? Erm, possibly, although with 14 million PCs upgrading on day one of the launch, Microsoft would have been mightily pleased with that.

August

The gaming community came together in August to see whether a crowd-play attempt to have a whole load of people play *Dark Souls* via Twitch could really work. After a few early teething problems, the experiment did work... kind of.

August was also the month in which one of the year's bigger hacks took the headlines, as Carphone Warehouse announced the leak of the personal details of 2.4 million customers. Among those were thousands of

encrypted credit card details, and this was all rather worrying and embarrassing for the company. Not as embarrassing, perhaps, as the chap who was arrested for shooting a drone that flew over his garden, quoted in the press as saying "I have a right as an American citizen to defend my property."

Spotify's Daniel Ek had to apologise when users aired anger over the company's updated privacy policy, stating that the firm would have access to data on users' smartphones when signing up. Ek explained

that any data would certainly not be used in any way without a user's permission. Caught in an entirely different type of storm was one of Google's datacentres in Europe, which lost data permanently as a result of a lightning strike. How much? 0.000001%.



September

Camera maker Canon did a bit of showing off in September with the announcement that it has developed a 250-megapixel camera sensor, which is quite a lot bigger than anything housed on your mobile.

Whatever mobile that is, it's unlikely to be one of Amazon's Fire phones, which Amazon binned following relatively poor sales. Poor sales are not generally something you associate with Apple, though, which announced the iPad Pro to kick off the autumn season. This tablet has since gone on to garner some fantastic

praise and reviews and is perhaps a genuine alternative to a desktop system.

At the other end of the cost spectrum, Amazon went straight for the budget market with its £49 Fire tablet. Again, with good reviews, behind it it's hard not to see both Amazon and Apple having done okay this Christmas.

Forget all this, though. The most important news of the month – and quite possibly the year – was the news that the world record score for *Donkey Kong* was beaten at the Donkey Kong Online Open event. That score now reads 1,172,100. Beat that.



October

We're now beginning to venture into the territory of news that you'll no doubt remember all too easily, because it was only weeks ago. The biggest and most damaging story in recent months is quite probably the TalkTalk hack, not only because of the scale of it but because of the way that the company handled the news at the time.

October wasn't all bad, though, with Microsoft releasing its Surface Pro 4 model to some great reviews. *The Witcher 3: Wild Hunt* bagged five awards, including top prize, at the Golden Joystick Awards, where there was also a lifetime achievement award for former Nintendo CEO Satoru Iwata, who sadly died earlier in the year. Easily the biggest news of the month, though,

was surely the \$67bn that Dell said it was prepared to pay for data storage company EMC. That would be the biggest technology deal ever, unsurprisingly.

In Georgia, USA, a rap music video made by prison inmates found its way into the wild via social media, leading to many, many questions requiring answers from the prison authorities. Finally, a round of applause please for Joe Kelly from Cheltenham, who played *Minecraft* for 35 hours, 35 minutes, and 35 seconds in order to raise money for cancer research.



November

Could you feel the (actually rather disappointing) force? Yes, *Star Wars Battlefront* was released at the back end of November after months of hype. However, it turned out to be another in an increasingly long line of AAA game releases that failed to set the world alight. It'll sell big, no doubt, but don't gamers deserve just a little more than games that look great but lack in the gameplay department?

Talking of games, *Sensible Soccer's* Jon Hare launched a Kickstarter campaign to breathe new life into a successor to the classic footy game. Hoorah! The campaign was subsequently, and pretty quickly, ditched as it failed to gain enough interest. Hooroo.

Sony killed off Betamax, leading many to ask "Is it really still going?", Apple killed Beats Music, leading many to ask "Is it really..." – you get the picture.

Meanwhile, the Pope himself asked people to think long and hard about excessive smartphone use. Perhaps this excessive use could be carried out on BlackBerry's new Priv mobile, a handset that the company is surely placing a lot of hope on for its wider survival.

Finally, Wikipedia bagged its five millionth entry (on a shrub by the name of *Persoonia terminalis*), and there was a big payday for King, as the *Candy Crush* developer was bought by Activision Blizzard for a whopping \$5.9bn.



December

And so we come to December, the month in which the Xbox 360 turned ten; *The Witcher 3: Wild Hunt* won another big gaming award – this time at the second annual Game Awards in America – and a little-known film called *Star Wars: The Force Awakens* came to cinemas. We're not sure anyone was too bothered about that.

The past few weeks have also brought news that fairy lights could affect the quality of your wi-fi, that Microsoft's Live Writer is turning to an open-source format, and Yahoo's

announcement that it actually wasn't going to spin off its stake in Alibaba after all (see January), instead looking at spinning off Yahoo's core business. Ultimately, the biggest point about this is that it could be seen as a rejection of a plan initially put forward by Marissa Mayer who, it has to be said, hasn't exactly had a stellar year in the eyes of the media. What will 2016 bring for Mayer and Yahoo?

More importantly, will anyone be able to beat that *Donkey Kong* high score?

Movie Edit Pro 2015

Get some mileage out of all those digital photos you have lying around

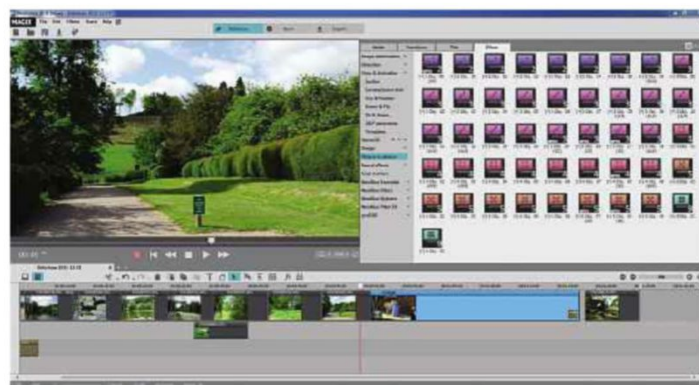
DETAILS

- Price: Photostory 2016 Deluxe £34.99
- Manufacturer: Magix
- Website: www.magix.com/uk
- Requirements: Dual-core 2GHz CPU, 1GB of RAM, 2GB disk space Windows 7 or later (64-bit versions)

Hands up those who have thousands of digital photos lying around. Keep your hand up if none of them have ever been printed or even looked at since they were taken? Well, I guess the forest of hands would indicate that it applies to most of us. If you still have your hand up, one solution would be to pick out the best of them and turn them into a slideshow or, if you're more adventurous, some sort of multimedia extravaganza.

Whatever end of that particular spectrum you choose, Magix's latest Photostory 2016 Deluxe will get the job done. It's a product that leans heavily on the video technology that Magix has become well known for, using similar functions and a layout that will be familiar to anyone conversant with video editing.

I seem to be repeating myself each time I review a Magix product, because the amount of content included with its products is remarkable, and Photostory 2016 is no different. In fact, when you consider what some companies charge for professional effects and transitions, you quickly realise the exceptional value this represents. As well as the standard content provided on the installation DVD, it



▲ Just some of the effects on offer



▲ Output using DVD-style menus

includes over 6GB of downloadable content. You also get free copies of Magix Photo Manager 15 Deluxe and the Magix Song Collection.

So that gives you some idea of what you get for your money, but if you don't want to get too involved in the production process, the Magix team have thought of that as well. You can get the job done with very little input if you use the Slideshow Maker option. This provides a fairly simple set of menus with single-click options, determining the theme and pace of your project. Firstly, there's a set of style templates to choose from, with a preview option to help you visualise the result. (Incidentally this preview option is a constant feature of all the effects etc. throughout

the program.) So once you've decided on a style, you can make it unique by changing just a few other options. These include the intensity of the project, the type of transitions and effects you prefer, your choice of music, and titles. Of course you can leave all that to the Slideshow Maker if you wish, but to be honest, it's quite easy and fun to do; it also makes the final project more interesting for your viewers. If you particularly like the style you've created, you can save it to use again. Once you've finished the creative bit, a single click on the apply button is all you have to do. And I have to say the results are generally better than you those you might create on your own.

On the other hand, if you do like to get involved, the world is your oyster, and of course you'll get to see how easy the interface is to use. For example, if you want a simple cross fade between slides, you simply push one into the other. The distance they cross determines the timing of the cross fades; there's also a small marker at the top of each slide you can use for the same purpose. Adding other effects is just as easy; having watched a preview, you simply click on the down arrow to apply the effect to the current slide.

As you might expect, the program includes comprehensive output options, again with a range of pre defined DVD-style menus to choose from. The preview in this case displays a handset so you can check that the chapter markers are set where you want them.

Finally, this version includes better image optimisation, new high dynamic range effects, optimised multitrack performance and the facility to arrange your slides so they match the beat of the soundtrack.

mm Joe Lavery

Comprehensive and realistically priced



Tales From The Borderlands

As the series comes to an end, can we consider it a tale worth telling?

DETAILS

- Price: £18.99 for the full series
- Manufacturer: Telltale Games
- Website: goo.gl/uE2AH7
- Requirements: Core 2 Duo or better, 3GB RAM, 512MB graphics card, Windows XP or later / Mac OS 10.7.x or later

Over the last 11 years, Telltale Games has made a name for itself by producing point-and-click adventure games that adhere to many of the traditions of this genre. The episodic nature of these games differs from self-contained adventures of old, but the puzzle solving element is the same, especially in the titles that resurrect names like *Sam & Max* and *Tales of Monkey Island*. You find objects, talk to people and try to work out what's required from you to progress. Sometimes, a walkthrough is your only hope.

But there's also another side to this company's output: a type of point-and-click game that's oddly free of puzzles. Rather than perplexing players with brainteasers, games like *The Walking Dead* and *The Wolf Among Us* focus purely on the theme of choice. You choose what your characters say to each other and what actions they take, but there are no wrong choices. In fact, the only thing you can do incorrectly is to fail the frequent quick-time events, which normally results in your death, and the a reload from the last checkpoint.

Tales from the Borderlands is one of these types of game. Based on the universe from the popular Gearbox-developed



Borderlands FPS series, it introduces a whole cast of new characters – although a few familiar faces do show up, with villain Handsome Jack being a particularly prominent player.

As you'd expect from this type of Telltale Games title, there's not really any gameplay to speak of. Yes, you do get to click on items and pick things up, and the aforementioned quick-time events give you something resembling action, but there's never much of a challenge. No, the things that keeps you playing are the story and the characters.

In this case, you take control of Fiona, a con artist from the lawless planet Pandora, and Rhys, a corporate pen-pusher working on a space station owned by the ruthless Hyperion company. These two complete

strangers find themselves thrown together (along with a selection of their friends and family) in a race against time, as they go in search of a Vault Key. As fans of the *Borderlands* games will know, these are highly prized artifacts, which open alien 'Vaults' on Pandora, full of mystery and unimaginable riches.

The way plot unfolds is nicely paced, and it ramps up the intrigue towards the end of each part of the series (thankfully, though, now it's over, you don't need to wait months to find out what happens next). However, what really makes *Tales from the Borderlands* shine is the excellent performances of the cast. Among them are Troy Baker (Rhys), a man who never seems to stop working, and



whose videogame CV includes voice work in the *Call of Duty* games, *Far Cry 4*, *Mass Effect 3* and many, many other award winning titles. He and the rest of the cast do a fantastic job, but for us the real highlight is Patrick Warburton, as Rhys's pompous and cruel boss. As well as a voice artist, he's also a movie and TV actor, and if you don't recognise his name, we're willing to bet you'll know his voice.

The inclusion of Patrick Warburton also points to the kind of game that *Tales from the Borderlands* is: yes, you care about the characters, but it's primarily a comedy. Indeed, it couldn't really have been anything else, considering its source material. And yet there is some emotional depth here too, and by the time you come to the end of the fifth and final episode (*The Vault of the Traveler*), you'll be genuinely sad it's over.

mm Anthony Enticknap

Interactive storytelling at its best



SwannOne Smart Home Control Kit

The Internet of Things is repackaged by Swann with variable success

DETAILS

- Price: £399 (Maplin)
- Manufacturer: Swann
- Website: goo.gl/QUvNcT
- Requirements: Android or iOS mobile phone, broadband internet connection

Swann is a well-known purveyor of security-related tech, and we've covered its cameras in Micro Mart before. But with its new SwannOne range, it's dived headfirst into the Internet of Things, where an ensemble of connected devices can be used to secure your home.

These devices come individually or as a package like the Smart Home Control Kit that Swann sent me to review here.

The critical component at the heart of the system is the SwannOne Smart Hub. Think of this as a router for the other devices, which interfaces with your broadband router and allows you to remotely control all aspects of your setup. This

Includes

- Smart Hub x 1
- KeyFob x 2
- Motion sensor x 1
- Window and door sensors x 2
- SoundView Cam - Indoor x 1
- Smart plug x 1
- Ethernet cable x 2
- Power adaptor x 2
- Batteries
- Security stickers
- Quick start guide



box actually doubles as a phone charging station – one of the nice design aspects of this equipment.

Setting up is just a matter of powering up the hub and then using the MAC address from the sticker

respects, it is straightforward to configure and doesn't require any special tools or skills to install. Well, assuming that you're familiar with computers, wi-fi, pairing devices and generally mastering technology.

And that's the rub really, because this isn't something that everyone would find a breeze to deploy, and some of the terminology and methodology might flummox the average iPad user.

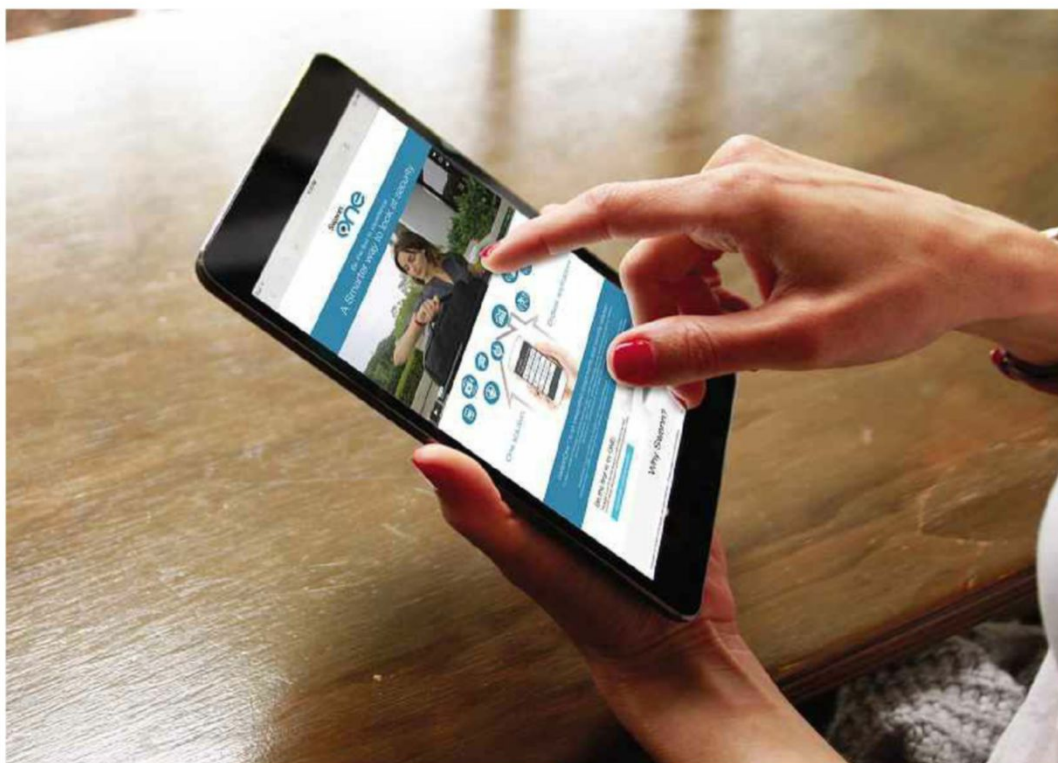
Obviously, the Smart Home Control kit is meant to be the start of your investment, and Swann makes a wider range of devices you can add once you have the Smart Hub running. These include outdoor cameras and an external siren, and the system is also compatible with other IoT equipment, like Kwikset

“ Having used the system for a while, it generally works acceptably ”

With the Smart Hub you also get two KeyFobs, a motion sensor, two Window/Door sensors, an indoor SoundView camera, a smart power plug and all the cables and accessories to make it all function. You even get some window stickers to alert local burglars that you've something worth stealing.

on the rear to register on the SwannOne website. Once you've established that association, you can pair the other components to the Smart Hub and then control them using any iOS or Android device using a simple application.

I did have a little trouble setting up the KeyFobs, for whatever reason, but in most



SmartCode Deadbolt Locks, Yale Digital Door Locks, Jasco Plug-in Smart Switches & Smart Dimmers, Centralite 3-Series Appliance Modules, Samsung SmartThings Power Outlets, Phillips Hue bulbs and the Nest Thermostat.

That last item might be a cause for concern, not least

because it was infamously hacked back in 2014, and despite the maker's best efforts, that sort of insecurity mud sticks. That said, the hack as I recall required physical access, and the SwannOne system is designed to avoid that scenario from the outset,

What may also concern some people is the cost outlay, because this isn't at the level of impulse buy for most people. In terms of reducing the cost, if you've got a more specific need, you can buy just the Smart Hub (£139.99 from Maplin) and then just those accessories you're interested in. Door sensors are £44.99 for a double pack, and cameras are £119.99 each.

Totting up the contents of the Smart Home Kit, buying all the parts would cost you £435, so if you use everything in it, there's a discount to be had.

Included is limited email and push notifications to two smartphone users; those wanting more or remote lock control pay a monthly fee of £7.49.

Having used the system for a while, it generally works acceptably most of the time, with the exception of the

KeyFobs, which aren't well designed at all. They have unprotected buttons that can easily be activated in a pocket or bag without you being aware. Why this wasn't obvious to those people designing them is odd, because it becomes apparent to anyone using them almost immediately.

And any sort of localised wi-fi interference can set off the alarm, which can be a problem if you're a long way from home when it happens and you're unaware. Any sort of power outage would also undermine the system entirely, from what I can ascertain.

Overall, I like Swann's thinking here from a conceptual perspective. It just needs to refine some of the components so it doesn't annoy its customers with phantom alerts and accidental deactivations. Problems like that just make people wonder why they didn't just buy a dog or stay home instead.

mm Mark Pickavance

An Internet of Things security ensemble that needs some work



Asus Z170-A Motherboard

Asus augments its Z170 chipset series with something affordable

DETAILS

- Price: £114.98 (Dabs)
- Manufacturer: Asus
- Website: www.asus.com/uk
- Requirements: LGA 1151 (Skylake) processor, DDR3 or DDR4 memory

Since I covered the Skylake processor and its associated platform, I've been hunting for a motherboard that delivers an optimal intersection of price and performance.

Cheap H110- or H170 motherboards are good, but they lack overclocking features and PCIe lanes, among other things. The answer is the Z170 chipset, but the price puts many people off, with a few designs being well over £300.

But the Asus Z170-A costs less than £120, uses the same chipset and has many of the more desirable high-end features. So is the Asus Z179-A a bargain or are you missing out in some subtle way with it?

First off, I want to point out a few things about the Z170-A that I don't like, and there are a few minor wrinkles I need

Key Features

- 5-way optimization.
- A dedicated on-board water-pump header.
- Asus Pro Clock technology.
- Crystal Sound 3, Intel LAN and Turbo LAN.
- USB 3.1 on board.
- One Type-A port plus a reversible Type-C port.
- 5X Protection II: Advanced hardware safeguards.
- Four DDR4 slots up to 3400MHz (OC), 64GB maximum.
- M.2 and SATA Express.
- 3x PCIe x16 (8x8x4) and legacy PCI slot.
- DVI, VGA, HDMI and DisplayPort (three active at any time).



to highlight. The most obvious of these is the huge plastic shroud that covers the I/O area, there for a purpose this writer couldn't rationalise. Luckily, two screws easily detach it, if it clashes with your case layout or system sensibilities.

There are also three PCIe x16 slots, when there aren't enough PCIe lanes to drive them at any more than 8x/8x/4x. And that assumes that no other lanes are used on the other slots or in storage. Those who want a triple-GPU arrangement still need the X99 over Z170, though this design is both SLI and CrossFireX compliant if you fancy dual GPU gaming.

Once you get past those minor points, this is a great design with a feature set that easily justifies the additional cost you'd incur over a H170 board, for example.

One of these critical features is an M.2 SSD slot, and the Z170-A has one that can be used either in PCIe mode or SATA. There are also four SATA 6Gbps ports, and this is the first design I've seen with a SATA Express port.





Initially, I'd thought Asus had been a bit frugal with USB 3.0 ports available, as there are just two in the I/O area, along with two USB 2.0 ports. Closer inspection revealed both a USB Type-C port and the new teal-coloured USB 3.1 10Gbps port.

Being beyond what Intel's silicon offers, Asus added a new ASMedia USB 3.1 controller just for those two ports. The Z170 chipset supplies the rest, and there are dual front-panel headers for both USB 3.0 and USB 2.0 on board. That's a whopping 14 USB ports, if you weren't keeping count.

“ You should have no problem getting your processor to 4.7GHz ”

But where this design really shines is if you've got a 'K' class processor or some enhanced DDR4 memory modules. The Asus UEFI BIOS is knee-deep in tweaks to be made, and you should have no problem getting your processor to 4.7GHz or higher, and the memory modules to 3400MHz, if yours can go that quick.

Asus used a new 'five-way' optimisation model on the Z170-A that's designed to get the most out of your memory and CPU, even if you don't use an unlocked CPU.

This is by far the quickest Z170 board I've tested, and it easily locks horns with designs that cost double or more what this one does. The

difference between this and a cheaper board is small, but it's discernible.

What I could have done to enhance these numbers would have been to have used an M.2 drive instead of a conventional SSD, though that didn't seem an entirely fair comparison.

If there is a caveat here, it's that this board is really made to the constructional quality of a sub-£100 design, and there isn't anything special about the build quality like you'd expect from the high-end models.

The relevance of that aspect is entirely dependent on how long you keep your systems before moving on and if you're expecting long-term reliability.

Overall, if you want a Z170 system that has most of the things you're likely to need in the next few years, then there aren't many rational arguments against the Asus Z170-A.

mm Mark Pickavance

An affordable Z170 board with many of the trimmings

Test	Asus Z170-A	Asus Z170-P	Asus Z170-P D3	Asus H110M-A
Street Price	£115	£94	£80	£50
PCMark Home 3.0	3644	3617	3463	3582
3DMark SkyDiver	4166	4223	4145	4102
3DMark Cloud Gate	7747	7683	7591	7439
3DMark Ice Storm Ext	49486	49406	50411	47965

All tests performed with Intel Core-i5 6500 32.GHz, 8GB of Corsair Vengeance DDR3 or 8GB of Crucial Ballistix DDR4 and a Crucial MX



Humax FVP-4000T

Humax enters the arena of Freeview Play with a new set-top box

DETAILS

- Price: £199.99 (500GB)
- Manufacturer: Humax
- Website: humaxdirect.com/uk
- Requirements: n.a.

The FVP-4000T set-top box is the first venture into the arena of Freeway Play by Humax. This Humax box is supplied with a remote control and leads for mains power, Ethernet and HDMI connectivity. Similar in size and shape to the Humax HDR-1100S reviewed recently, apart from the faux leather look to the top of the box, it's available with either 500GB or 1TB of storage, with a choice of colours (white with gold trim, and cappuccino or black with silver trim and mocha top).

Setting up this box, with a choice of Ethernet or wi-fi to a local network, via a HDMI connection to a television, is meant to be straightforward. However, my first attempt produced a problem in that no audio was being received by the television from the Humax box. My solution was to switch to another television, and this solved the problem.

Once set up, this Humax box offers a range of features that are accessible from the large, supplied remote control. By pressing the home button on the remote, a scrollable menu appears on the television screen, allowing you to switch between TV guide, Recordings, On Demand, Media Centre and Settings, plus a recent category that appears once the box has been used for access content.



The EPG (electronic programme guide) allows you to make full use of the three tuners built into the Humax box. Up to four programmes can be scheduled for recording simultaneously, while a fifth programme can be watched live. Programmes can be selected for recording on a one-off basis or as part of a series with a choice of SD or HD broadcast when available. Recorded content will be stored on the unit's internal hard drive, providing up to 300 hours of programmes, and then made available from the Recordings option for viewing later.

Providing catch-up television is the main function of the On

Demand feature of this box. You can select from BBC iPlayer, ITV Player, All 4 and Demand 4 services for your fix of missed programmes. This section also contains links for items that include YouTube, Euronews and Internet Radio.

The Media Centre, as you might expect, handles your personal collection of music, videos and photos. Some of this content could be stored on an external device, such as a flash stick or hard drive, which is then linked to the Humax box via a USB port on the right side of the device. As soon as a device is connected to this port, a message will appear on the television's screen announcing

its arrival and offering a choice of music, video or photo content. You can then access the content you want. Generally, this process was trouble-free but on a couple of occasions, content was not detected, even though it had been accessed from this source during an earlier session and was still available from the Recent option. This is disappointing, and to date, I have not got to the bottom of this anomaly.

The Media Centre can also be used to access appropriate content stored on your local network. According to the user guide supplied with this product, you're meant to be able to access the Humax internal hard drive from a computer on the same network. However, whenever I tried to do this I received a message that the drive was not accessible as I did not have the required permission to use this resource.

Considering the other problems with had with the FVP-4000T, it's hard to really recommend it. Hopefully, though, some of these flaws can be remedied at a later time.

mm Michael Fereday

Some useful features but one or two worrying issues



Razer Mamba: Tournament Edition

Does this fast-mover strike a chord?

DETAILS

- Price: £79.99
- Manufacturer: Razer
- Website: www.razerzone.com
- Requirements: USB port, a love for sensitivity and illumination

Razer has a history of producing much-loved, high-quality, peripherals. But with the brand well known by both enthusiasts and pro gamers, the buying choice comes down to two key things. First, is it affordable? And second, is it fit for day-to-day use?

Taking on the price question, £80 isn't exactly cheap, but it's not an unheard of price when it comes to acquiring a top-quality product from a recognised brand. Still, with the Mamba TE there's something a little different going on... and it's the inclusion of the world's most sensitive mouse sensor. A sensor which, developed in partnership with Philips, delivers up to 16,000dpi sensitivity. That's not only a little justification of price, it's an extraordinary achievement too – one which, if you're into bragging rights, should make the Mamba TE even more desirable.

Such a high maximum DPI is a headline grabber and perhaps usable by pro-gamers suited to higher sensitivity settings, but is there a more real-world benefit? Razer argues yes, with heightened DPI being useful in multiple display setups. It's a fair comment, although perhaps not the most persuasive.

Yet sensitivity isn't only to be measured in maximums. Through Razer's Synapse software tool, users can fully customise the Mamba TE's DPI settings and intervals. With a



range of 100 up to 16,000dpi, any sensitivity can be achieved through employment of single unit increments. Yes, you read that right. Should you so wish, you can set a DPI level of 10,438 or anything else within range. It really is a level of customisation yet to be seen in a mouse.

If DPI customisation alone isn't flamboyant enough, one look at the Mamba Tournament Edition brings to light the coloured strips down either side of its body. These, as well as the Razer logo on the mouse rear and the scroll-wheel, are smartly lit by 16 LEDs in a range of static colours or sequences. Again, this is controlled through the Synapse

Tool, and Razer boasts 16.8 million colour options. It's an impressive lightshow, and one which – thankfully – can be turned off when the computer goes to sleep!

In the middle of all of this, the question remains of how the mouse is to actually use on a day-to-day basis. Well, as someone who's solely used it for several days, I'd say it's a pretty impressive showing. Razer suggests there's an ergonomic form factor at work for 'complete comfort'. And it is comfortable, but anyone with a larger hand or preferring a palm grip will likely find the respective lack of height and lack of palm elevation not

quite to their requirements. You may also find that your little finger, lacking any consideration, is the one thing preventing the freedom of movement given by the mouse's underside Teflon glide pads.

These considerations in mind, the Mamba Tournament Edition is otherwise comfortable and performs well. Its construction is up to standard, and the designers are clearly at ease with matter-of-fact design choices some fail to consider. Rubber grips along the sides of the mouse body provide a good hold, and the side-buttons are perfectly positioned for easy thumb-reach. The pimpled roll-wheel is well weighted and easily controlled, and the DPI adjustments buttons are quickly actioned without ever being at risk of being pressed in error.

Other features are as expected. A tough braided cable, and the option for macro creation and storage (once again through Synapse) are present. But with all this considered, it's that tough decision of price versus suitability needing most thought. Razer has produced an impressively specified mouse and not just for the pro-gamer.

mm Kevin Pocock

**Professionally priced,
and positively
positioned**



GROUP TEST

Two-bay NAS Drives

To think we used to have a dedicated PC for serving files and folders and with limited storage of any media we owned. These days, a NAS drive can do everything the old Windows Home Server machines could and with a little more power on offer too.

We have six two-bay NAS drives on test this week, to see which are worth spending your hard-earned pounds on.

Two-bay NAS Drives

Buffalo LinkStation 220DE

DETAILS

- Price: £69.99
- Manufacturer: Buffalo
- Website: goo.gl/NAX5wP
- Requirements: Wired network in place, any modern browser for access and admin



Buffalo does a pretty impressive job when it comes to its line-up of smaller NAS units, especially with the LinkStation range. Although considered the baby of the LinkStations, the 220DE is really quite a capable unit.

This two-bay NAS unit is capable of housing 2.5" or 3.5" drives up to a maximum of 4TB, with supported RAID levels 0, 1 or JBOD. Powering it, there's a Marvell ARMADA 370, 800MHz dual-core CPU with 256MB of DDR3 RAM, helping to drive the DLNA, iTunes and Buffalo Private Cloud services that the 220DE offers out of the box.

The design is remarkably simple. The front bay door is removed, revealing the two hot-swap-like drive caddies, which slot in easily enough – although there's not a lot of space left for air flow. There's a single gigabit Ethernet port around the back of the unit together with a single USB 2.0 port and power plug. The large 80mm fan vent dominates the remainder of the rear of the 220DE and the matt-black side panels are well constructed and certainly feel solid enough.

In terms of design, the 220DE is quite simple, but functional. Aside from a small red strip along the top of the front of the door and the white LEDs indicating the powered-up fitted hard drives, there's not a lot else going on.

▲ *The Buffalo 220DE is a cheap and cheerful NAS drive*

Our tests were run reasonably well. HD content was streamed without any problems, and thanks to the combination of the internal CPU and the decent operating system, you can successfully stream up to four different HD videos to different devices without the dreaded circle of buffering appearing.

As a backup solution, the 220DE works well enough. The transfers were reasonably speedy, and provided you're not attempting to back up the entire contents of half a dozen computers, you should be suitably satisfied with the unit.

The built-in GUI is simple enough to understand and works well when you get into creating RAID level drives and setting up the various shares and so on. However, it's not quite as intuitive or as well laid out as the Linux-based GUIs we've now become accustomed to. There's a simple nested menu to one side and little information expanded into, which can leave you feeling a little lost if you're not used to setting one of these up. The desktop-type GUI may be more of a resource hog than a simple menu, but it has brought with it a vastly improved interface to help manage the unit and any connected users and devices. In the case of the 220DE, while the user interface may be easy to



use, it lacks depth, and as a result can be quite frustrating, especially if you've used a better UI.

The Buffalo LinkStation 220De isn't the best-looking unit to ever grace our desks, but it's functional and it works well without the fancy bits other manufacturers have gone for. Saying that, it is limited, in both hardware (with the single USB port around the back) and software.



D-Link ShareCenter DNS-320

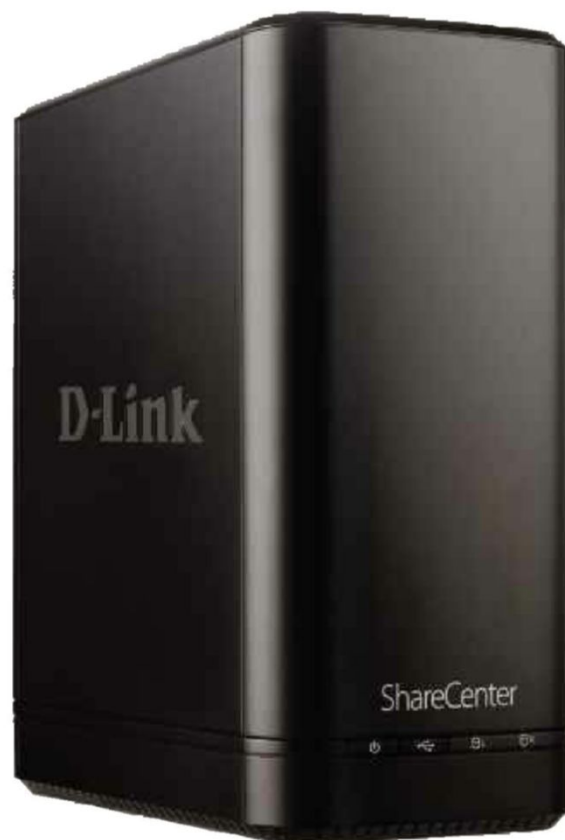
DETAILS

- Price: £45
- Manufacturer: D-Link
- Website: goo.gl/gnMVjN
- Requirements: Wired network in place, any modern browser for access and admin

This D-link ShareCenter is a two-bay storage NAS unit that offers a straightforward solution for the reasonable price of around £45.

You can purchase it as a diskless unit, but there are options for a preinstalled single 1TB hard drives or 2TB and two 2TB hard drives, which obviously increases the cost. The unit is equipped with a single gigabit Ethernet port and a single USB 2.0 port, along with several flashing LEDs in a strip along the front of the polished black case. The CPU powering the unit is a 800MHz Marvell 88F6281, with 128MB flash memory and 128MB SDRAM.

The installation was easy enough, thanks to a step-by-step wizard, which takes you through the process of getting your drive active and ready for copying media content to. An interesting element of the setup procedure is the configuring of an email address, which is used by the unit to message you should anything start to go wrong, such as higher than normal temperatures or a failure in one of the components. You'll need to have your SMTP server information handy before you enter the information, which for some may be a little confusing, especially since the ShareCenter prides itself on making the setting up of a



▲ The D-Link ShareCentre DNS-320 is a good but basic NAS drive



▲ Most users will find it fine, but power users will want a little more

NAS very easy. However, it's not impossible, and with little effort you get access to a nifty feature.

The build quality of the ShareCenter is good, although it's a bit of a nuisance for attracting dust, but it feels reasonably sturdy and looks okay despite being a dust and cat hair magnet. The rear exhaust fan can become a little noisy, and we had a problem to begin with where it seemed to make everything vibrate, but a gentle poke with a screwdriver soon fixed that.

There are plenty of features that come with the NAS and its web admin setup. The usual print server, scheduled backup, FTP server, iTunes server and UPnP/DLNA servers are available, as well as support for

Apple Time Machine and an EasySearch utility for Windows machines. You can RAID the hard drives in JBOD, RAID 0 and 1, and SMART disk monitoring is enabled by default.

Although the ShareCenter looks good and won't be out of place among the other shiny black devices that litter our homes these days, it does have some flaws that mar an otherwise good setup. For starters, it's not particularly quick; the tests we ran placed it at the bottom of the group, and navigating the web admin GUI seemed a little too clunky and slow for our liking. Writing a 4GB file saw speeds of just 12MB/s, which is enough for watching most content, but if you're using this as a backup device, then you're going to be

stuck watching the progress bar for a long time.

On the whole, although the ShareCenter is a decent NAS unit, which is simple to use and has a few good features, it's probably a little too slow for power users' tastes, and with the rather slow interface, more advanced users will probably grow somewhat impatient.



Two-bay NAS Drives

QNAP TS-251

DETAILS

- Price: £200
- Manufacturer: QNAP
- Website: goo.gl/vHbBbT
- Requirements: Wired network in place, any modern browser for access and admin

QNAP puts a lot of emphasis on creating NAS units that do far more than simply serving shared folders. You can play games off QNAP units, create a virtualisation server and even hook them up directly to your TV via HDMI.

Inside this two-bay NAS you'll find a dual-core 2.41GHz Intel Celeron CPU and 1GB of DDR3L RAM (expandable up to 8GB), along with 512MB of flash memory. You can fit two 3.5" or 2.5" SATA drives in the hot-swap cradles, which slide easily into the unit and lock into position.

The rear of the TS-251 features a HDMI port, a pair of gigabit Ethernet ports, two USB 2.0 ports and a single USB 3.0 port along with the power and a pinhole reset. The front contains a further single USB 3.0 port, the power button, a one-touch copy button, a strip of LED indicators and, of course, the two drive bays.

Driving all this is a customised, embedded Linux operating system called QTS 4.1.1, with which you can configure the TS-251 and set up the RAID configurations for the inserted drives. The UI is large, colourful and extremely easy to use, and offers you the ability to tweak the NAS unit to your particular specification or to delve deeper into its inner workings



▲ An extremely powerful and capable NAS drive



▲ The QTS operating system is the best we've seen on a NAS drive

“ The installation of the TS-251, with two drives fitted, is very quick indeed ”

for a more advanced level of configuration.

The services the TS-251 offers via the NAS Management facility include the usual DLNA server, but with the added ability to hardware transcode video in real time for up

to five different devices simultaneously. There's also a myQNAPcloud wizard, which can publish the TS-251 NAS services to the internet. And in addition there's an advanced file synchronisation tool called Qsync. Other standout features include a backup station,

advanced music management and serving, a torrent download station and a built-in anti-virus layer to protect your files.

In addition to all that, there's also a VPN service, MySQL server, a network-based surveillance station and server and many more services via the QNAP App Centre, such as the aforementioned virtualisation, Dropbox support, Google Drive Sync, Drupal and even an app-based version of *Super Mario Bros*.

The installation of the TS-251, with two drives fitted, is very quick indeed. Within about five minutes, we had a pair of 1TB drives wiped, RAIDed and were back on the login screen ready for a system update and the installation of some selected apps. The Celeron CPU and 1GB RAM helps push the TS-251 along at a rate of knots and keeps it up to speed even when the device is pushed to the limit through serving media, transcoding and when being used as a web and backup server.

The added benefit of being able to plug it directly into a TV with the HDMI port is a feature that other manufacturers should really start to look at. In short, it's one of the best NAS units we've ever had to test.



ZyXEL NSA325v2

DETAILS

- Price: £70
- Manufacturer: ZyXEL
- Website: goo.gl/VEJG2e
- Requirements: Wired network in place, any modern browser for access and admin

For a while it looked like ZyXEL had left the home NAS scene, but the company gave its 300-series a facelift and has come back with this.

The NSA325v2 is a two-bay NAS unit, which can take up to 4TB 3.5" or 2.5" SATA-II drives in either RAID 0, 1 or JBOD configurations. There's a single gigabit Ethernet port around the back, alongside two USB 2.0 ports, pinhole reset and the power. The front of the unit houses a single USB 3.0 port, power button and the copy/sync button that's commonly found on the ZyXEL range of NAS units.

Inside, the 1.6GHz Marvell CPU and 512MB of memory keep the data flowing nicely and process the many features of the NSA325v2 without too much of a drop in performance.

As for the design, there are some alterations from the previous NSA325. The look of the unit has changed slightly, with ZyXEL omitting the grooved lines of the drive access front door for a polished-black effect and incorporating a nice, aluminium-effect strip down the side for the various LEDs and control buttons. In addition, the swing and release door of the NSA325, which was a particular bugbear of ours, as it always felt very flimsy, has been



▲ The ZyXEL NSA325v2 has undergone some great changes



▲ It's a good-looking device and one that performs well too

“ The list of features this unit has is more than good enough ”

updated to a push and slide removable cover, which we're pleased to say feels much better and a lot more solid than the previous model.

The drive bays are also updated, this time with a

proper hot-swap-like tray and handle system combined with a release button on the bottom. This makes removal, replacement and general access to the interior of the unit far better, and probably

improves the airflow around the installed drives.

Once the drives are fitted, it's simple to get everything up and running through the included software and the ZyXEL NAS Starter Utility. Also, the web configuration and admin side of things appears to have seen a facelift too, and it's now a lot easier to get to grips with. But it's nowhere near as polished as the built-in Linux-based software in the QNAP example.

As you would expect, the list of features this unit has is more than good enough for most users. The usual DLNA, FTP and web server offerings all are present, as well as smart-device application support and phpMyAdmin/MySQL support. There's also a Hybrid Cloud feature present which, like most modern devices, allows you to create your own cloud system, with access locally or remotely in a flexible and secure environment.

ZyXEL has done a good job with the second version of this reasonably popular NAS unit. There could be further improvements to the OS layer and perhaps some more design tweaks here and there, but on the whole, it's more than enough for home users or even small offices.



Two-bay NAS Drives

Synology DiskStation DS715

DETAILS

- Price: £300
- Manufacturer: Synology
- Website: goo.gl/1SXkSC
- Requirements: Wired network in place, any modern browser for access and admin

Synology has, in the past, offered a wide and varied selection of NAS units for both business and home users alike. The quality is generally very high and, of course, the added benefit of the built-in Synology DiskStation Manager software has lured in many customers.

This is a two-bay NAS box, costing in the region of around £300 but with a pretty impressive list of features and specifications. What you get for your money is a unit with a quad-core 1.4GHz Annapurna Labs Alpine AL-314 CPU, complete with hardware encryption, 2GB of DDR3 memory, two USB 3.0 ports, an eSATA port and the latest copy of DSM 5.2 all ready to go.

The two hot-swap drive bays can take 3.5" or 2.5" SATA-3 or SATA-2 disks up to a maximum of 16TB (a pair of 8TB drives), formatted with EXT4 and in an assortment of RAID levels. And you'll also find a pair gigabit Ethernet ports and a decent sized 92mm quiet fan to help keep the fitted drives cool.

There are a number of great features that come with the DS715. The first is the ability to expand the storage capacity by using the eSATA port and the Synology DX513 expansion unit – which incidentally

▲ *An exceptional NAS drive from Synology*



▲ *Although good, it is quite expensive*

can house five drives to a maximum raw capacity of 40TB. Added to the 16TB from the DS715, that brings the total storage capacity to an impressive 56TB.

This, however, doesn't mean that the DS715 is a business-only device. Within the DSM, you'll find the usual media server, photo station, audio station and backup add-on packages.

But you'll also have access to a custom cloud station, mail station, web server and a surveillance station. There's even a VPN station for up to 15 simultaneous connections. Needless to say, you'll likely find a DSM app (or, rather, add-on package) to suit your needs, while adding further use to the NAS unit.

The design of the DS715 is much in the same vein as the

other Synology products. A compact unit, measuring 157 x 103 x 232mm, housed in a matte-black metal case with toughened plastic front and rear faces. The drive bays are easily accessed via the push and release clips at the front, allowing you to slide the drive bay out and fit or replace the hard disks. It's fairly standard stuff but in a design that works well and has proved itself to be low-key enough to stand in a living room or office without drawing too much attention to itself.

Fitting a couple of drives and getting them set up in a RAID array is extraordinarily simple. Once you attach to the DS715, the DSM walks you through the process in a quick but intelligent fashion, offering you more advanced options, should you already know what you want. Within a matter of 15 minutes or so, our pair of 2TB test drives were set up in RAID 0 and ready for content, as was the DSM desktop.

The Synology DSM may seem extraordinarily expensive, but considering what you get, it's a rather extraordinary bit of kit. However, the equivalent QNAP box is a £100 cheaper, so you'll need to look into it a little more first.



Seagate STCT200

DETAILS

- Price: £117
- Manufacturer: Seagate
- Website: goo.gl/PNJWGP
- Requirements: Wired network in place, any modern browser for access and admin

Surprisingly, Seagate doesn't produce a lot of NAS devices for homes or small offices. Instead, the company tends to lean more enterprise and heavy duty network storage solutions. Therefore, this two-bay model is something of a loner in the company's line of storage products.

The STCT200 is the two-bay version of the STCT4000200, which, as you would expect from the name, is a four-bay device. However, both models share similar specifications, in that within there's a 1.2GHz ARM processor and 512MB of DDR3 memory as the driving force behind the many services they support.

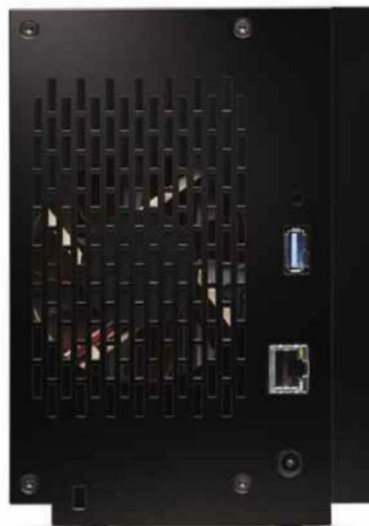
In addition you also get a pair of USB 3.0 ports, a pair of gigabit Ethernet ports and a one-touch backup button that will copy a set folder and files to a pre-determined location or vice versa. The pair of SATA-2 channels can take up to 5TB hard drives and support both 2.5" and 3.5" hard drives to JBOD, RAID 0 and 1.

The list of supported network file protocols and services is quite lengthy but not as comprehensive as some of the other models we've already looked at – such as the examples from QNAP or Synology.

CIFS/SMB, NFS v3, FTP, SSH, SNMP, NTP, Bonjour



▲ A good NAS drive for home or the office



▲ The webadmin side though was very slow

and so on all are all present, and you also get the usual complement of media streaming capabilities too.

On paper, the Seagate STCT200 is certainly an impressive NAS drive, but we did find it to be exceptionally

slow when compared to the other units on test. Although the actual serving of a folder or file was fine across our gigabit network – in that we could access those files just as quickly on this device as the others – the actual setting

up of the STCT200 took the best part of a day, and that was only with a couple of 2TB drives at RAID 0.

Also we found navigating the Seagate NAS OS 4 embedded Linux administration layer very slow. Whereas we could click on disk management features on the other Linux NAS units and they'd appear instantly, there was always a wait of nine or ten seconds before this unit kicked in.

Fair enough, that's not a long time to wait for anything, and there's a good chance that Seagate has put in some form of error checking to make sure you're getting exactly what you want to view. But it just doesn't seem quite as fluid as Synology or QNAP's embedded operating systems.

Having said all that, the Seagate STCT200 performs well enough when you actually use it on the network. Streaming media isn't a problem, and neither is backing up data from multiple computers.

It's also reasonably priced too, at around £117. That's not bad considering the level of performance that the unit has to offer and the range of services it covers. It's just a pity it's so slow when you come to administer it.





QNAP TS-251

It may well cost a fair bit more than some of the other NAS drives on test, but the QNAP TS-251 is light years ahead with the technology it uses and supports.

It's a solid, quick and dependable NAS that'll keep getting better, thanks to the embedded operating system and collective apps available.



ZyXEL NSA325v2

This was a tight run between the Synology DiskStation DS715 and the ZyXEL NSA325v2. However, we feel the ZyXEL has the upper hand due to its overall cost compared to the Synology model. However, the Synology does pack an immensely impressive list of features and processing power. If you're willing to spend £300, then it'll be worth every penny. If, however, you simply need a two-bay NAS drive, the ZyXEL has everything you'll need.

How We Tested

Each NAS unit was tested on a home gigabit network with either a pair of 2TB Toshiba 3.5" hard drives or a pair of WD 1TB .35" drives, where possible.

A single 4GB HD video file was copied across the network, to and from the NAS unit. And media was streamed to a PC, tablet, Xbox 360 and PS3 simultaneously.

	Buffalo LinkStation Live	D-Link ShareCenter DNS-320	QNAP TS-251	ZyXEL NSA325v2	Synology DiskStation DS715	Seagate STCT200
Price	£69.99	£45	£200	£70	£300	£117
Total HD Capacities	Up to 8TB	Up to 8TB	Up to 4TB	Up to 8TB	Up to 16TB	Up to 10GB
Internal Processor	ARM 800MHz CPU	ARM 800MHz CPU	Intel Celeron 2.41GHz CPU	ARM 1.6GHz CPU	AL-314 1.4GHz CPU	ARM 1.2GHz CPU
Size	87 x 126 x 205mm	113 x 146 x 182mm	168.5 x 102 x 225mm	108 x 205 x 147mm	157 x 103.5 x 232mm	170 x 120 x 218mm
Number Of USB ports	1	1	4	3	2	2
Avg 4GB Write Speed	35MB/s	12MB/s	70MB/s	50MB/s	65MB/s	40MB/s

Top 5

Computing Acronyms

And remember, kids, an acronym has to spell out a word...

1 GNU

Let's get things started with one of our very favourite acronyms, and one which comes with the added bonus of being recursive. As well as being the name of a genus of antelopes, GNU is, of course, a Unix-like software system developed by the Free Software Foundation. But while it might be *like* Unix, it's *not* Unix. Yes, GNU's Not Unix – GNU. There are loads more recursive acronyms in computing, including Ace (Ace Code Editor) and PIP (PIP Installs Packages), but none of them led to the slightly rude name for an image editor GIMP (GNU Image Manipulation Program), so GNU wins for us.



▲ A GNOME, sitting on a GNU, drinking some WINE...

2 WINE

WINE use to be a WINdows Emulator, but these days, WINE Is Not an Emulator. Whatever it is, it's able to do something that's somewhat akin to magic, by making Windows programs work in Linux. Oddly enough, its namesake, wine, is also able to perform a kind of magic, making everything we say sound charming and witty to us, while everyone else finds it weird or slightly offensive.

3 CAD

Computer-aided design allows us to make all kinds of amazing things with relative ease, and it's been with us since the 1970s. That's a pretty long time, but what's been around even longer are men who behave dishonourably, especially towards women. We put these kind of cads right down there with bounders, and we generally disapprove of them – unless they happen to be Terry Thomas, in which case that's okay.

4 GNOME

Like the GIMP, GNOME is born from the GNU acronym, and it's short for GNU Network Object Model Environment – so you can understand why people call it GNOME instead. The reason we like this abbreviation is obvious: it makes us think of garden gnomes, with their cheery little faces and pointy hats, sitting on toadstools and fishing in garden ponds. And when you're dealing with something as dry as GNOME, having a happy, smiling gnome in your head can only be a good thing.

5 GUI

Controversially, this one might not really be an acronym. Seeing as it's only three letters, you could just as easily pronounce it as an initialism (so G-U-I), but according to font of all user-edited knowledge, Wikipedia, it's actually pronounced 'gooey'. This is still currently being debated in the Micro Mart Shed, but let's just assume it is gooey for now and salute it for the ridiculous-sounding acronym that it (apparently) is.

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Adventures In Text

Part One: Laying The Foundations

Leo Maxwell begins a short introduction to the Linux command line

This began as an attempt to help my grandson learn the Linux command line. In the process, I was surprised how many holes I filled in my own knowledge. To attempt an in-depth study of the Linux command line would require several books. Some commands are very powerful and have many, many options. There are even entire books dedicated to single commands, and there's a huge amount of material online.

There is always more than one way to carry out a given task. That is the fundamental nature of Linux, and each user finds their own favourite methods and short-cuts.

Hopefully, this series can give you a basic grounding in the command line environment and give you the confidence to carry out common tasks. It will give you some tips about the Linux command line world and perhaps whet your appetite for more.

“ While the GUI undoubtedly led to a revolution in the spread of computer use, there are sometimes compelling reasons to avoid it ”

Why Use The CLI?

Even Windows was originally built on a command line interface. Once known as DOS, it has a new incarnation called PowerShell, which is increasingly used for work on servers. These days, a comparatively low-power computer can run a graphical interface or multiple sessions at the same time, either locally or across a network. While the GUI undoubtedly led to a revolution in the spread of computer use, there are sometimes compelling reasons to avoid it.

1. Efficiency

GUIs use resources. Although many modern computers have powerful processors, fast GPUs and plenty of memory, the recent popularity of credit-card-sized computers such as the Raspberry Pi and the new MicroBit mean that a new generation of computer users are finding that the GUI is a little more demanding than they like. Removing the need for a fancy graphics card or even a monitor can also reduce electricity bills. If a server is running without a monitor, why run a GUI?

2. Speed

The added overhead of graphics processing makes GUI applications slower. Even simple things like copying a folder full of files can take

three or four times as long using a drag and drop GUI compared to a simple command. In the case of large file transfers across a network, this can cause a transfer to fail because the process times out. Using text commands is often quicker than finding the required combination of mouse-clicks to carry out simple tasks. As an example, instructions for complex operations using a GUI often need pictures and can run to a few pages, compared to a few of lines of text that can be cut and pasted into a terminal.

Roadmap

The basic file Linux hierarchy is shown below. Happily, the Linux filesystem hierarchy is fairly well defined, and although some distros may vary it, most are fairly consistent.

/	root directory containing all other directories.
/bin	Essential system commands, needed for all users.
/boot	The kernel and other files needed to boot the PC.
/dev	Files that contain the information needed to access and use devices.
/etc	Global configuration files.
/home	User's home directories containing user files and user-specific configuration files. Can be abbreviated to ~.
/lib	Shared libraries required for binary programs in /bin and /sbin.
/lib64	64-bit specific libraries (only in 64-bit distros; no longer widely used).
/media	Mount points for removable media (e.g. CD-ROMs or USB drives).
/mnt	Temporarily mounted filesystems, such as extra hard disks.
/opt	Optional application software packages.
/proc	Virtual directory for running processes.
/root	Special home directory for the root user.
/sbin	System commands that usually require sudo rights to use.
/srv	Specific files served by the system.
/tmp	Temporary files, often deleted at shutdown.
/usr	Secondary hierarchy, containing locally specific files and data.
/var	Variable files (i.e. files that change a lot during normal processes, logs, spool files, etc).

3. Flexibility And Power

Some operations do not have a GUI equivalent at all, and command line tools are often more powerful and informative. A simple text directory listing can be far clearer and easier to read than a 'prettified' GUI version.

4.Remote Access

For those of us with a narrow internet 'pipe', running a GUI over a slow internet connection is a painful experience. A terminal link via an SSH connection is much more usable.

5.Security

A GUI introduces additional complexity. Applications on the desktop are often only a front end to one or more underlying commands. This reduces security, as the more complex a system is, the more likely it is that somewhere a possible vulnerability has been overlooked. Such errors are commonly exploited to compromise a system.

To sum up, a text-based environment offers the best combination of speed and power, coupled with a low overhead and better security.

The Bare Bones

A CLI (command line interface) runs in what is known as a terminal emulator. The 'terminal' nomenclature harks back

Running Headless

If you want to run your terminal on a headless computer over the network, it will mean a little preparation.

The target machine will be best with a fixed IP address. How you go about this will depend on your circumstances, but you will need the following information:

The IP address that you want the server to have: It will have obtained one automatically from your router via DHCP (Dynamic Host Control Protocol), but that could change. It is possible to allocate a fixed IP for a device from some routers, or you can set it on the PC. Mine obtained 192.168.0.14 automatically, but I changed it to 192.168.0.95, which put it well outside my router's range of automated addresses.

The subnet mask: This will need to be the same as other devices on the same network. Mine is 255.255.255.0, which is very common, and means that the first three numbers in all local network addresses must be the same. It allows a maximum of 254 local devices. The last number must be between 1 and 254, and it must be different for each device on the network. For example, my devices are 192.169.0.1 (my router) 192.168.0.2, 192.168.0.3, 192.168.0.4, and so on.

The gateway address, if you want access to the internet: This will be the address of your router. Mine is 192.168.0.1.

The DNS server address: Most routers act as DNS relays, so this will usually be the address of your router. Another useful DNS server is Google's, which is 8.8.8.8. If you're using a Windows PC on the same network, typing `ipconfig /all` in a DOS terminal will give you most of this information.

The following example will work with most Debian-based distros, including Ubuntu on a PC and Raspbian on the Raspberry Pi. I will use my settings in the text, so you'll need to adjust them to suit your network range.

Although some command line fanatics will insist that there are no text editors other than `vi` or `emacs`, they're both more than a little daunting for a beginner. My favourite text editor is `nano`, a nice user-friendly program, which has the advantage of displaying the most common commands at the bottom of the screen. It's installed by default on many Debian distros, but there are many other editors, and you'll probably find your own favourite.

We will also use the `sudo` command to temporarily take root user privileges. To start, type `sudo nano /etc/network/interfaces` in a terminal. This will open the network interface configuration file in the `nano` text editor. It will look something like this on Ubuntu (the first line beginning with `#` is just a comment):

```
# interfaces(5) file used by ifup(8) and ifdown(8)
auto lo
iface lo inet loopback
```

On Raspbian on a RaspberryPi it will look like this:

```
auto lo
iface lo inet loopback
iface eth0 inet dhcp
```

You will need to edit it. The example below will give the computer a static address of 192.168.0.95, and will work for either distro.

Of course, you'll have to make entries appropriate for your own network.

```
auto lo
iface lo inet loopback
auto eth0
iface eth0 inet static
address 192.168.0.95
netmask 255.255.255.0
gateway 192.168.0.1
dns-nameservers 192.168.0.1 8.8.8.8
```

Press `Ctrl + O` to save it, press `Enter` to confirm, then `Ctrl + X` to exit. Restarting the system will apply the changes.

You will also need to make sure that SSH is installed and running. SSH stands for 'secure shell' and provides an encrypted connection between two PCs. On Ubuntu and other Debian-based distros, you can install it by typing `sudo apt-get install ssh` in a terminal. The SSH server should run automatically, and listen on port 22. You can then connect to it from another PC using an SSH client. From a terminal on another Linux PC, you can type the following command: `ssh username@ipaddress`

(e.g. `ssh leo@192.168.0.95`) and you will be asked for your password to connect.

For Windows, PuTTY is an excellent graphical tool for both standard Telnet and SSH connections. It will also run on Linux. The Windows version can be downloaded from tinyurl.com/2r4w and the Linux version is already in many repositories.

It doesn't even need to be installed; you can just run the .exe file or launch it, and you'll see a window like this:

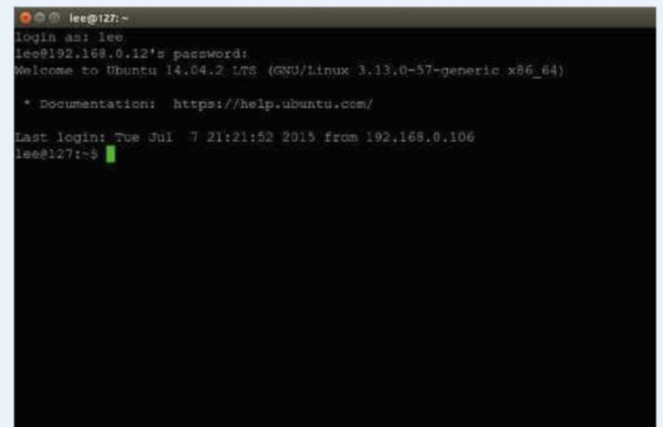


▲ The PuTTY launch dialogue



▲ The ssh key message

If you enter the IP address of the target computer and click open, you'll be prompted to allow the installation of the server's key. This is to ensure that you only connect to a known secure host. Answer 'yes' to this, and then you'll see the login screen. Log in with your username and password, and you should be looking at an ssh terminal window.



▲ The ssh login screen

Once connected to a remote ssh terminal, you're logged in as if you were sitting at the other computer's terminal screen. You can move around the filesystem, execute commands and generally do anything that you want.

To leave, simply type exit.

to the days before GUI-based computers, where it would actually be a physical terminal, running a text-based session on a mainframe computer. Early versions lacked even a screen, boasting only a keyboard and printer, sometimes called a Teletype terminal (TTY).

There are many terminal emulators for Linux, and any distro will offer at least one. Within the terminal sits the 'shell' text environment. There are many of these available, but among the most widely used in Linux is bash (the bourne again shell, an enhanced version of the original Unix sh shell, which was written by Steve Bourne). This is the one that I will be referring to in these articles.

The hardware required for this series is minimal: an old PC running Linux or a Raspberry Pi would be ideal. If you lack a spare monitor, once installed, the OS will quite happily run headless, and you can connect over the network.

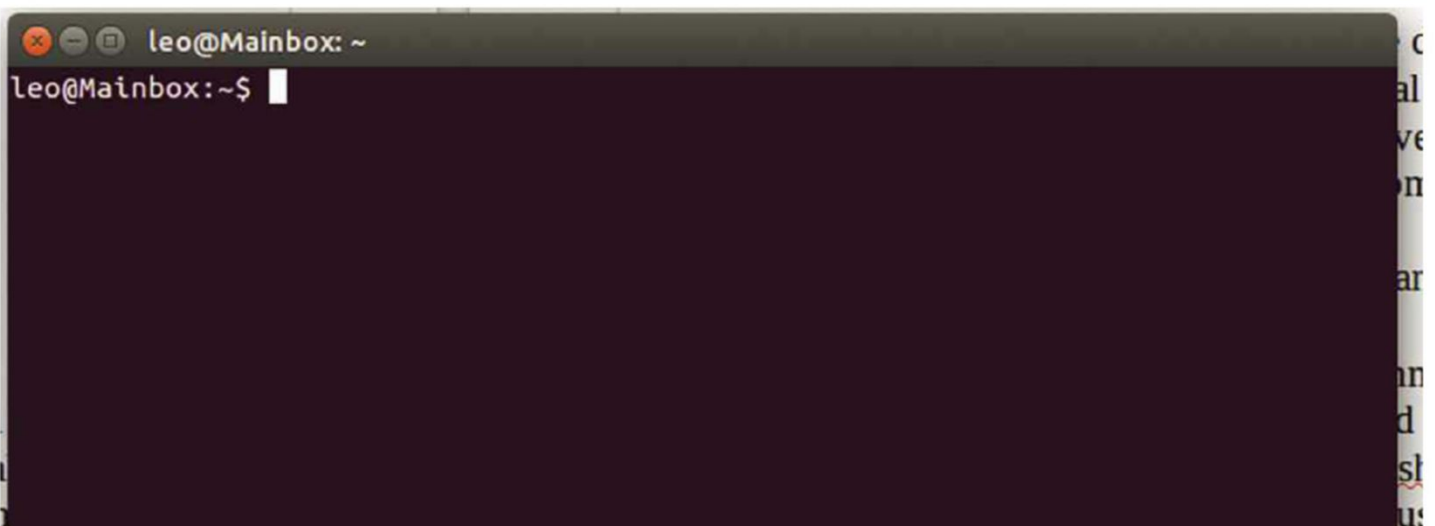
Practising on a safe platform rather than a live system is recommended. Although a Linux system is seldom irretrievable, until you become confident with its operation, it's reassuring to know that you can easily start afresh.

A Raspberry Pi is perfect for this and uses very little power. You can keep a copy of the system SD card to hand for easy reinstallation if you break things, and you're not gambling with your main PC's data.

If you don't have any suitable hardware, a virtual machine host such as Virtualbox can be used on Windows or Linux, running a Linux virtual guest.

Getting Started

When you open a terminal window, the first thing you see will look something like the image below. The line with the flashing cursor at the end is called a 'command prompt', because



▲ A typical terminal window

the cursor is prompting you to type a command. Commands in Linux are sometimes referred to as binaries, which simply means that they're pre-compiled code. They run in a terminal session, but some can detach from the session and run in the background, waiting for an event to trigger them. This type of command is said to be running as a daemon.

Scripts are essentially text files that can be run as an executable program. They consist of a series of commands combined using the shell's command syntax to carry out more complex tasks.

One important difference between Linux and the Windows DOS shell is that Linux is case sensitive. Commands are almost always lower-case only, but files or directories may not be, so /home/Pictures is different to /home/pictures, for example. This is easy to forget at first and can lead to 'command not found' or 'no such file or directory' errors.

“ Navigating a filesystem without a GUI can be confusing at first ”

Another common problem is 'permission denied' when trying to use a command. This is usually either because you do not have permission to execute the command or you do not have access to files you are trying to modify. Many commands require root access. As well as being the base of the directory tree, root is the all powerful superuser, who can access all areas (of which more later).

Finding Your Way Around

Navigating a filesystem without a GUI can be confusing at first.

The filesystem is considered to be shaped like a tree. The base of the system is the root, and this branches into... er, directories. Directories can contain files and other directories. The tree analogy is then totally lost, as a directory containing other directories is known as the parent, and the directories it contains are called child directories. The forward slash is used to denote a step on the path to a particular file. The root directory is designated by a single forward slash (/) and should only contain directories. Each step deeper into the directory tree is marked with a further forward slash thus: /var/log/test/test.log.

By default, when you launch a shell session, you will be in your own home directory, which will be /home/<your user name> (e.g. /home/fred).

The ls and cd commands can be used to find your way around the filesystem, and I suggest you try these out to familiarise yourself with your new domain.

ls (list) is used to view the contents of the current directory, showing all files and subdirectories. It can also be used to display the contents of a different directory (e.g. ls /etc will list the contents of the /etc directory).

Some shells indicate the type of files in a directory by colours. For example, in my shell, executables are green, text files are white, and directories are blue.

cd (change directory) is the command used to move around the filesystem. It can be used to move up and down the filesystem tree or to jump to another location within it. Typing

```
leo@Mainbox:~$ ls
audio  Documents  Music  Pictures  SHARE1  Videos
Desktop Downloads openvpn  Public  Templates VirtualBox VMs
leo@Mainbox:~$ ls -l
total 48
drwxrwxr-x 2 leo leo 4096 Feb  9 2015 audio
drwxr-xr-x 2 leo leo 4096 Aug 20 09:19 Desktop
drwxr-xr-x 39 leo leo 4096 Aug 25 20:26 Documents
drwxrwx--- 17 leo leo 4096 Aug 18 20:22 Downloads
drwxr-xr-x 102 leo leo 4096 Aug 15 16:31 Music
drwxr-xr-x  9 leo leo 4096 Jun 19 2014 openvpn
drwxr-xr-x 25 leo leo 4096 Aug 25 20:27 Pictures
drwxr-xr-x  2 leo leo 4096 Dec 23 2014 Public
drwxrwx---  2 leo leo 4096 Mar 11 20:41 SHARE1
drwxr-xr-x  2 leo leo 4096 Dec 23 2014 Templates
drwxr-xr-x  2 leo leo 4096 Dec 23 2014 Videos
drwxr-xr-x 13 leo leo 4096 Aug 18 20:10 VirtualBox VMs
leo@Mainbox:~$ ls -la
total 392
drwxr-xr-x 57 leo leo 4096 Aug 26 22:10 .
drwxr-xr-x  7 root root 4096 Jul 13 21:27 ..
drwx----- 3 leo leo 4096 Dec 24 2014 .adobe
drwxrwxr-x  3 leo leo 4096 Jul  1 16:55 .AMD
drwxrwxr-x  3 leo leo 4096 Feb  9 2015 .audacity-data
drwxrwxr-x  2 leo leo 4096 Feb  9 2015 audio
-rw-----  1 leo leo 14731 Aug 26 22:10 .bash_history
-rw-r--r--  1 leo leo 220 Dec 23 2014 .bash_logout
-rw-r--r--  1 leo leo 3637 Dec 23 2014 .bashrc
drwx----- 35 leo leo 4096 Jul 28 10:08 .cache
drwx-----  3 leo leo 4096 Dec 23 2014 .complz
drwx----- 40 leo leo 4096 Aug 18 08:43 .config
drwx-----  3 root root 4096 Jan  4 2015 .dbus
drwxr-xr-x  2 leo leo 4096 Aug 20 09:19 Desktop
-rw-r--r--  1 leo leo 25 Dec 23 2014 .dnrc
drwxr-xr-x 39 leo leo 4096 Aug 25 20:26 Documents
drwxrwx--- 17 leo leo 4096 Aug 18 20:22 Downloads
drwx-----  2 leo leo 4096 Feb 24 2015 .filezilla
drwxr-xr-x  3 leo leo 4096 Jun 11 2013 .freardp
drwx-----  4 leo leo 4096 Aug 26 21:06 .gconf
drwxr-xr-x  2 leo leo 4096 Feb  9 2015 .get iplayer
```

▲ Various styles of directory listing: ls, ls -l and ls -la

cd on its own will return you to your home directory. cd / will take you direct to the / (root) directory, and typing a path will take you directly to the directory at the end of it (e.g. cd /var/ log will take you to the log directory inside /var).

There are several abbreviations that are useful:

- .. represents the parent directory, so cd .. will move you up one step.

- represents the previous directory, so cd - jumps back to where you just came from.

- ./ represents the current directory and is used for executing commands within the current working directory (e.g. ./ installscript or sudo ./installscript will run the command installscript within your current working directory).

- ~ represents the home directory of the currently logged-in user, so cd ~/Pictures will take you to the Pictures directory in your own home folder.

When you get lost, a useful command is pwd (print working directory), which will display the full path of the directory that you are currently working in (e.g. /var/log/ www).

Command Usage

Those of you who have used DOS will see some similarities in the Linux shell. Both of them are based historically on the Unix command line.

When you type a command, the shell will search a series of directories in turn and execute the first matching command that it finds. This means once a command is installed, just typing its name at the command prompt will run it.



▲ The Virtualbox interface and a Xubuntu virtual machine

Modifying Command Behaviour

The way that commands behave can be altered by using flags, arguments and operators. Flags can be a single letter preceded by a dash, or a text string preceded by two dashes (e.g. `-a` or `--all`).

As an example, `ls` lists the contents of the current directory, but it's made more useful by using a flag (e.g. `ls -a` will list all files, even hidden ones. In Linux, any file preceded by a dot is normally hidden). These are usually config files or directories containing program data). `ls -l` will show files with more detailed information in a formatted list.

“ Once connected to a remote ssh terminal, you're logged in as if you were sitting at the other computer's terminal screen ”

Flags can be combined. For example, `ls -la` will show a formatted list of all files, including 'hidden' ones.

Arguments are not heated discussions, but data, such as a file name. They can be used to define a file to be altered in some way or contain information that alters the output of the command (e.g. `cd` has the target directory as an argument, as in `cd /Pictures`). By default, commands operate on files in your current directory, but you can also use the complete path to a file in another directory (e.g. `ls /etc/network` will list the contents of the `/etc/network` directory).

Operators are used to manipulate the output from a command. These are special characters, such as `&` `=` `+` `>` `<` `;` `|` etc. These can be very useful, as we shall see later in the series.

Nearly all commands have some sort of associated help file. The simplest is accessed by typing the command followed by `--help`, which gives a basic guide to the command's syntax (e.g. `ls --help` will list all the available command options).



▲ The RaspberryPi is an ideal device for exploring the Linux shell

If you want more in depth information typing `man` followed by the command (e.g. `man ls` will display a scrollable manual).

Many commands also have a Texinfo file, which can be called up using the `info` command. `ls` is part of the `coreutils`, so typing `info coreutils` will show you the full documentation for that complete package, which can be navigated with the cursor keys.

When you've finished with the terminal, you can close it by typing `exit`. If you want to close down the computer, the command is `shutdown -h now`. If you get permission denied, `sudo shutdown -h now` should work. Typing `shutdown -r now` will restart the PC.

As your knowledge grows, you will start to gain understanding of how your operating system works and more confidence when dealing with it. If you make a mistake, often all that's needed is to retrace your steps and you'll realise where you've gone wrong.

In the next article, we'll look further into the command line to examine more commands and their uses. [mm](#)

App Battle

Runkeeper Versus MapMyRun

It's each running app for itself as Rob Leane puts Runkeeper and MapMyRun to the test...

Much like the animals of Noah's biblical ark, popular apps often come in two by two. If there's a job that can be achieved by an app on your phone, there are probably two – if not more – companies competing to corner that particular market, in direct competition to one another.

As we continue trying to separate the digital wheat from the chaff, we're focusing in on two of the most popular running-themed apps in the business: Runkeeper and MapMyRun.

MapMyRun – attached to the sportswear company Under Armour – came first and has gathered over 30 million members since its launch in 2007. Runkeeper, on the other hand, has been knocking around since 2008 and has amassed a community of 45 million users. Both are available on Android and iOS systems.

Each app is hugely popular, then. If you're into running, chances are that you use one of these big name apps to keep track of your fitness regime. Of course, the question to ask is this: which one is the best? Only an App Battle can find the answer.

We put these apps through their paces, to save you the trouble of trying both...

Run The World

Runkeeper's aim is simple: to make the whole world your treadmill. The app achieves this by monitoring where you run, estimating each jog's calorie-burning total, encouraging you to set targets for yourself and compiling all this information into an easy-to-understand

personal database of information that you can browse through whenever you fancy.

It's very easy to set up an account with Runkeeper. Once you download the app, you'll be asked whether you want to sign up afresh or simply link up with your Facebook account to save a bit of time. I chose the latter, and within no time I was in and ready to go. To start a basic run, you just hit the 'Start' button at the centre of the menu bar and select 'Start Free Run.' As long as you have GPS signal, the app will find you and show you where you are on a map.

As you run, Runkeeper will tell you how many calories you're burning, how long you've been running for, and how far you've gone. It also keeps track of incline and your miles-per-minute ratio. After the run, all this information will be sent to your personal log of information, and you can see how your latest jog compares to all your others. I did a 10K run last summer, and I found Runkeeper really useful.

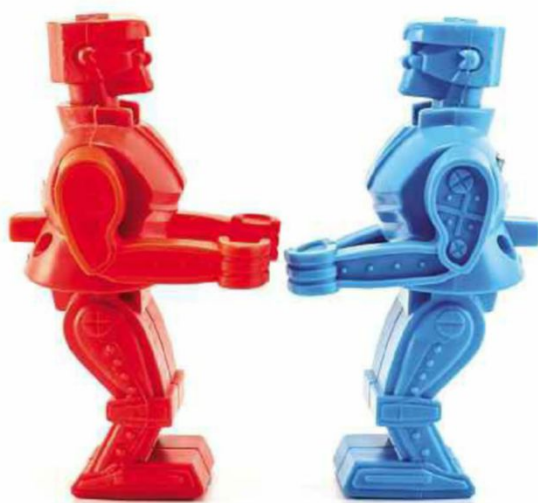
MapMyRun's set up system is much the same. You can create an account from scratch or simply stick in your Facebook details and a few facts about yourself (height, weight), and you're away. Once you're in, you're given a

guided tour that tells you everything about how to get the most out of the app.

Similarly again to Runkeeper's design, you simply click 'Record A Workout' from the menu to get started. From there, you can choose 'Start Workout', and the app will start monitoring what you're up to. You'll get all the same stats as you go – distance, duration, current pace and calories burned. At this stage, it really is impossible to tell these apps apart.

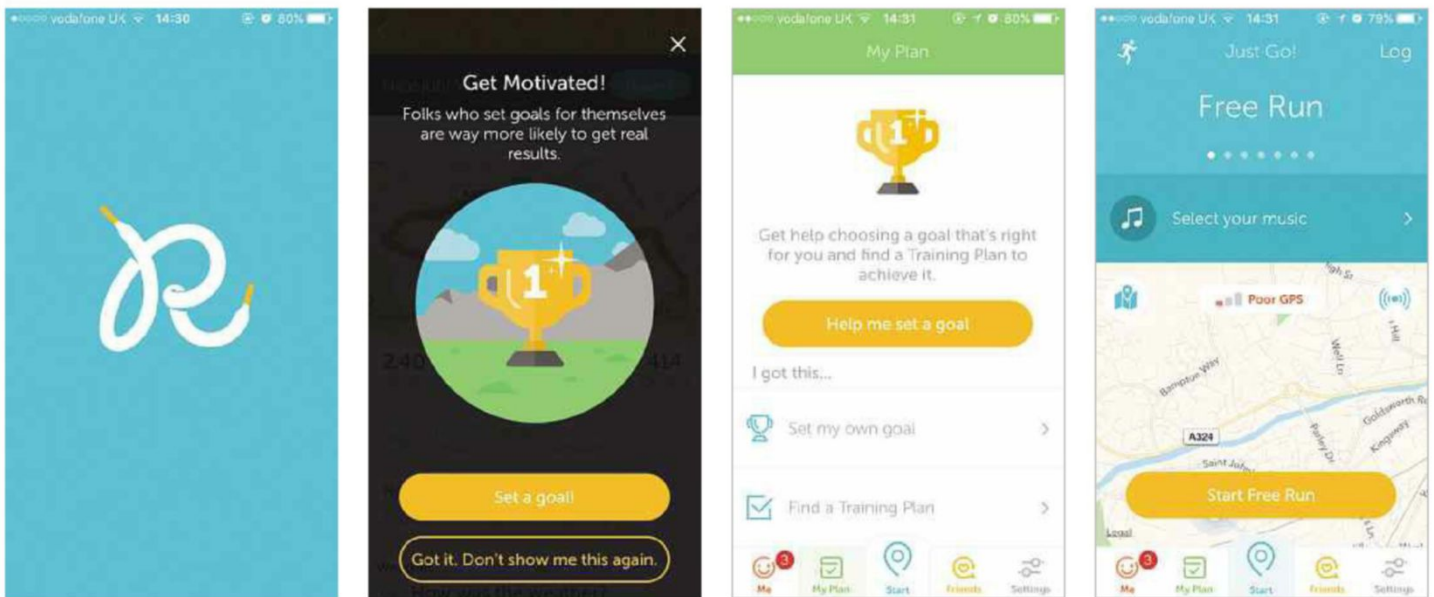
If there's a criticism for MapMyRun's basic interface, it's that it maybe took a minute or two more than Runkeeper to get started. But to be fair, the vast majority of savvy app users could easily skip the tutorial and still work out how to use MapMyRun a bit quicker than someone looking for things to criticise.

Winner: In terms of monitoring a basic freestyle run, there's virtually no difference



PAISAN HOMHUAN / Shutterstock.com





between Runkeeper and MapMyRun. Although I personally prefer the design of Runkeeper (I'll take Runkeeper's pastel colours and friendly fonts over the boring blues and white of MapMyRun any day), I'm going to have to call this section as a draw, based on the technical stuff.

Everything Else

Although their basic functionalities are nearly identical, both Runkeeper and MapMyRun offer plenty of other features beyond simply keeping track of you while you jog around the neighbourhood. For instance, in Runkeeper, the social element of the app is a fairly prominent feature.

As mentioned earlier, Runkeeper can be linked to Facebook. But even if you don't do this, you can still add your fellow fitness fanatic friends to add a bit of social interaction to proceedings.

Once you add a few friends, you'll find yourself keeping an eye out for

their progress. Maybe you'll even send a supportive 'Like' or comment their way from time to time. You can also go for runs together, and log the resultant stats as a duo (Runkeeper encourages collaboration and camaraderie over competitiveness). Making a social network out of exercise regimes is a great idea, adding a friendly community feel to an activity that can often be seen as boring or isolated.

Beyond just monitoring your random running routes, Runkeeper also offers a wide range of fitness plans and allows you to set specific targets like 'Run 10K by January.' You can also use Runkeeper to monitor other activities, including cycling, hiking, skiing, skating and rowing. As an all-in-one fitness companion app, it's hard to fault, in all honesty.

MapMyRun also has a social element, but it isn't as prominent on the mobile app. While Runkeeper has an easily accessed 'Friends' tab in the bottom right of the page

at all times, MapMyRun requires you to click into a side menu and then select 'Activity Feed' in order to see what your friends are up to. It's a small difference, but this makes the social element seem less central to the MapMyRun experience.

I've been using both apps on and off for a couple of weeks, and there certainly seems to be a bit more sociability on Runkeeper. That could only be accurate to my group of friends, though, admittedly.

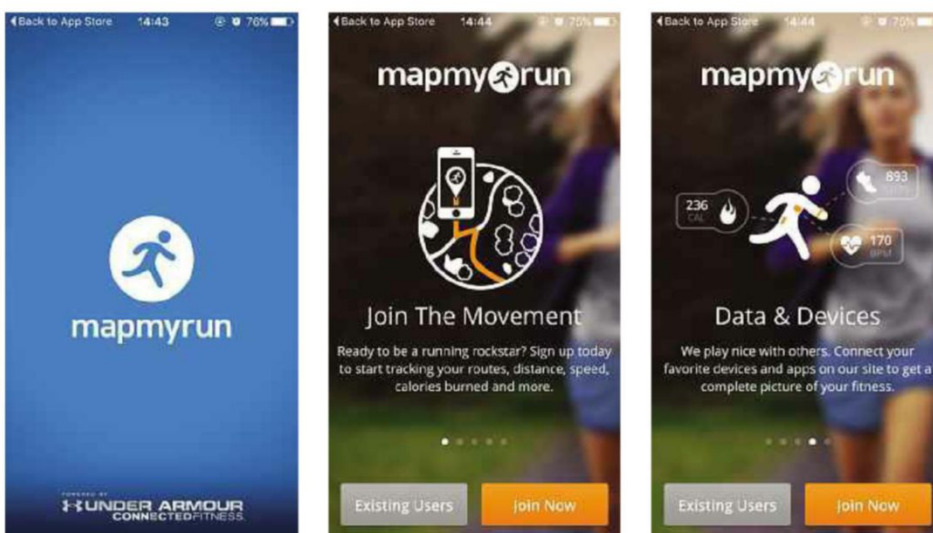
It's worth noting that MapMyRun supports a wider range of exercise types than Runkeeper, though. As well as the ones listed above, you can also measure boxing, canoeing, cricket, football, hockey and many other sports on MapMyRun.

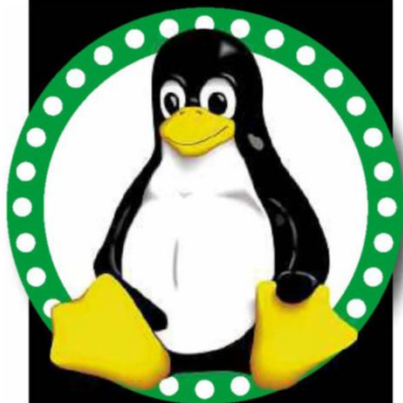
Both apps also have a paid premium service. MapMyRun's 'MVP' service costs £4.99 a month or £22.99 per year, and includes extra benefits such as broadcasting your running statistics live, advert removal, more training plans and audio coaching.

The 'Runkeeper Go' upgrade will cost you £7.99 a month £29.99 a year, but it has some cooler upgrades to justify the slightly bigger price: you can get Runkeeper to make you a pace-based personalised music playlist and access weather analysis, as well as live-broadcasting your running stats.

Winner: Runkeeper edges it thanks to better social integration and that cool bespoke playlist feature.

Overall winner: Runkeeper wins. This has been our closest App Battle yet, though, because the actual services offered here are literally exactly the same. But Runkeeper looks nicer and seems to work better socially. If you really want to monitor some boxing or canoeing, though, you'll need to swap to MapMyRun. [mm](#)





David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

Linux

Lesser Known Distros

Something a little different this New Year?

While most of us are using the latest Linux Mint, Ubuntu, Arch and so on, there are a great number of lesser-known distros available that are really quite interesting and a little quirky.

That's the beauty of Linux: you're not stuck with one theme, desktop or way of doing things. You can chop and change, evolve and even come up with something yourself.

If you have a spare PC available or you have a virtual machine project to try out for the new year, then check out some of these obscure Linux distros.

Mathbuntu

As the name suggests, Mathbuntu is a mathematics version of Ubuntu, which bundles Sage, Maxima, Geogebra, R and Netlogo, along with a collection of free maths textbooks and all manner of great open-source mathematical software.

If you fancy giving it a go, head to goo.gl/F020a2.

Poseidon Linux

If you're into your oceanography or sea-based sciences, then Poseidon Linux could be the distro you're after.

It's now on version 7.0, based on Ubuntu 14.04 and features some leading mapping, Bathymetry, GIS and seafloor terrain software among a collection of journals and papers of an oceanographic nature. For more information go to goo.gl/6CL9QE.

Vinux

Vinux is a distro that has been cleverly designed for those who are visually impaired. There's the Orca On-Screen Reader, support for Braille displays and a more improved accessibility functionality than any other distro – or operating system – we've ever come across.

Sterling work indeed from the Vinux team. If you're interested, you can find more information at goo.gl/9kLJCL.

Madbox Linux

Madbox is an extremely lightweight distro with the Openbox window manager, SLiM display manager and a very scaled down and streamlined system behind it.

It's available on a 600MB .iso and looks rather splendid. For more info, check out the main website at goo.gl/HGzVvz.

Satanic Linux

Satanic Linux is a distro that's often amused us, not just because it's catering for those who lean toward inverted pentagrams and goats blood, but also because it strangely provides links to other distros that are more of a religious feel.

Sadly, most of the front page is NSFW, so I won't provide a link. But if you are more of a Linux for the damned user, then I'm sure you can Google it.

Anyway, that's four examples to get your teeth into – or rather three if you prefer not to dwell on the devil worshipping one. Either way, there's enough to intrigue or inspire you for a possible project or to get into something a little different for the new year.

As always, if you have a lesser-known Linux distro you think would be interesting to the Micro Mart community, then please do write in and tell us about it.

Also if you've come up with a distro yourself and you think it's something everyone would benefit from, then again let us know at the usual address.



▼ Vinux: a Linux distro for the visually impaired

Amiga In 2016 And Beyond

Sven Harvey looks to the future

Hopefully by the time that you're reading this or very shortly afterwards, A-Eon Technology and AmigaKit will be taking pre-orders for the AmigaOne X5000 machine with its QorIQ P5020 dual-core 64-bit processor. The machine is expected to cost something in the region of £1,500-2,000. Later versions will be available with the quad-core 64-bit P5040 processor.

The Amiga OS is still in the process of fully realising 64-bit support and the forthcoming, but as yet undated, AmigaOS 4.2 will include multi-core support as the operating system moves towards its 64-bit future, which originally on Hyperion Entertainment's roadmap led to hardware agnosticism.

What that essentially means is that the AmigaOS could eventually be ported to other 64-bit architectures.

Also this year should see the release of A-Eon Technology's low-end AmigaOne, developed in partnership with ACube of Italy. The AmigaOne A1222 and its motherboard codenamed 'Tabor' features another QorIQ processor – the 32-bit P1022 dual-core SoC (system on a chip). However, this 'entry-level' system is highly unlikely to have a price south of £500.

Comparing this with the old days when the Amiga 500 or Amiga 1200 were on sale at £399.99, let alone today's PC

laptop market where a multi-core machine with 8-16GB of RAM and a 1TB hard disk can cost you less than £350, it's not exactly hugely attractive.

Clearly it's aimed squarely at computer hobbyists, but recent releases from the Raspberry Pi foundation – especially its smallest ever unit, the Raspberry Pi Zero puts that well and truly in perspective.

For those who are unaware, the Raspberry Pi Zero motherboard is smaller than a credit card and features a 1GHz 32-bit processor (ARM core) and 512MB of RAM – making it arguable more powerful than the AmigaOne XE I run AmigaOS 4.1 Final Edition on. Okay it's just a board and has very little connectivity, having just a micro-USB port for power, another to allow a hub to be added and a micro-HDMI port for audio visual connection – but it retails for £4 plus VAT!

The official AmigaOS, at least, appears to be locked to the PowerPC architecture, which unfortunately seems very much like a dead end with development being slow, and naturally aimed squarely at the embedded market, as that's where the technology's main customer base is. Okay, PPC Amiga emulation is now happening, but it's hardly the same, and emulating a PowerPC chip isn't exactly processor light on x64 PCs.

Hopefully the AmigaOS isn't a huge amount of time away from the eventual 64-bit nirvana of being portable to other architectures. Don't get me wrong either – Intel and x86/x64 chips are not what I am thinking is where the OS should head.

ARM made the Raspberry Pi possible and now has AMRv8.1 64-bit processors which should, all being well, end up being produced in such quantities that low-cost 64-bit boards could start to exist. Indeed, Broadcom, whose processors power Raspberry Pi boards, has the Vulcan ARM 64-bit SoC.

To chase down a new generation of the Amiga machine that people really held close to their hearts – the A500 and A1200 – a target price of no more than £199.99 needs to be held in mind as the AmigaOS is ported to other 64-bit architectures.

In my humble opinion, technological issues notwithstanding, 64-bit ARM needs to be the way to untie the AmigaOS from the millstone that PowerPC has become (and x64 would soon also be), and allow a new generation of hobby computer users to be truly creative again, in the same way the Amiga 500 or 1200 and the Deluxe Paint that came in the box did in the early 1990s.

A Pi-a-like board using a 64-bit ARM-based SoC could be just what the AmigaOS needs. Wasn't it someone at Commodore who said computers for the masses and not for the classes?

< The Raspberry Pi Zero and the 64-bit ARM Cortex A72 processor – a future match made in heaven and potential target hardware for AmigaOS 4.5?



Sven Harvey has been our Amiga specialist for over 16 years, drawing on his 25 years retailing computer and video games and even longer writing about them

Amiga





Ian McGurren is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

Mobile

Five Games For 2015

Ian looks at five games you may have missed in 2015

The year for hardware hasn't been the most exciting we've ever seen, with incremental updates being the order of the day. But while more powerful processors in much the same devices isn't much fun, the extra power they provide mobile gaming is, and in 2015 there have been some excellent titles.

Alto's Adventure

Let's start with a title that typifies a modern mobile game. Simple, addictive, gorgeous. *Alto's Adventure* is what you'd get if you boiled down *Trials HD* and *Temple Run* to their basics: namely one-button endless jumping with a fine physics model. Then weld it to retro 8-bit style 2D graphics through a magic-hour filter and you have *Alto's Adventure*.

Lumino City

Another utterly gorgeous game, this time from UK-based developer State of Play. Think *Myst* but in a cute, cardboard cutout world and you're

getting there. A point-and-click game with very clever puzzles, it's like playing a 70s kids TV programme (you can tell State of Play has huge respect for Aardman and such), and it looks especially good on the new Apple TV.

Need For Speed

A different type of gorgeous, *Need for Speed* is more of a contentious title given its use of in-app purchases. But that aside, it's a worthy successor to the excellent *Most Wanted*, and for people like me who generally dip in and out of games, there's enough to be getting on with without having to shell out much. Did I say it looks superb? It does, you know.

Brotherhood & This War Of Mine

Two games that originally came out to great acclaim on the PC, *Brotherhood* and *This War of Mine* are both excellent examples of different thinking on that platform that also translates well to mobile.

Both, though, are very different games: *Brotherhood* is a sort of *Ico*-like platform exploration type game that uses a clever two-people-controlled-by-one-person mechanic, whereas *TWOM* is a point-and-click survival title 'inspired' by the recent Baltic states wars. That they translate so well to mobile platforms demonstrates how far the hardware has come.

Minecraft: Story Mode

Talking of PCs, lastly there's the ubiquitous digital Lego (note, not LegoS), *Minecraft*. Well not actual *Minecraft* – that's been out ages – but the long awaited *Minecraft: Story Mode*. Why is this exciting? Well, it's not really what it claims; it's actually the latest adventure from the ever excellent Telltale Games, but it just happens to be set in the *Minecraft* world. So both fans of *Minecraft* and fans of high-quality adventure games can find something here. Not a fan of either? Well, unless you're a huge fan of Patton Oswalt (who voices the lead character), it might not be for you.

It has been a good year for games, so while the excitement of the technology arms race dies down a little, mobile gaming is really coming into its own. With the emergence of consoles based not only on Android but now on iOS, 2016 could well be the year the games make the leap to the big screen too. In the meantime, enjoy the new year!



Best Hardware Of 2015: Part 2

Andrew Unsworth runs out of space as he continues The Best of 2015: a Retrospective in Two Parts

Dear readers, may I be the among the first tech journalists to bid you a HAPPY NEW YEAR! I don't normally do caps, but when I do, I like it to be sincere. I hope you all had a great Christmas and a cracking New Year's Eve.

Last week, I kicked off a Best of 2015 two-parter, and by Best of 2015 I mean what I consider to be the best products of 2015 – the ones that loosened the strap on my wallet, even if they didn't completely release it.

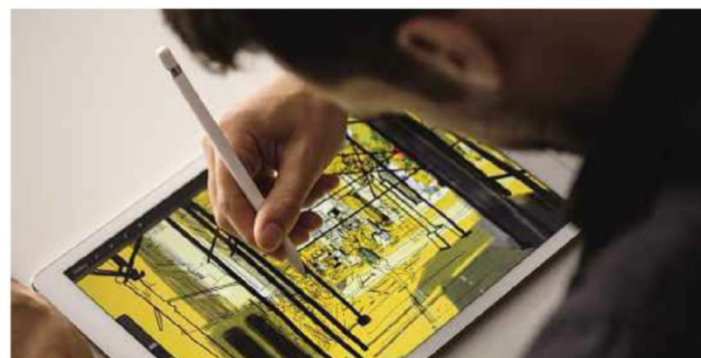
Last week, I sang the praises of Intel's Skylake processor range, as not only are the processors the most exciting desktop release since the Devil's Canyon chips (I'm ignoring Haswell-E, because only those in the know will buy it), they're also a first-class excuse to upgrade your motherboard and RAM while you're at it.

First up this week, I'm singing the praises of the iPad Pro (www.apple.com/uk/ipad-pro). It's not a revolutionary product, and it's long overdue in my not-so-humble opinion, but it's still a thing of beauty. It takes the iOS ecosystem and plants it in a super-slim 6.9mm thick chassis with a 12.9" screen. The extra screen size makes it even more usable as a work computer, and there's even an optional Apple-made keyboard available to help users get the most out of it. The iPad Pro isn't cheap, though, and you can get a MacBook Air for less than the price of the 128GB version, but if you like iOS and prefer a tablet, then you'll find the extra £50 for it somewhere. Of course, you could always go for the cheaper 32GB version.

Speaking of tablets, the Microsoft Surface Pro 4 (tinyurl.com/jcmdshh) absolutely needs

special mention. The Surface Pro is the tablet that started the trend for tablet computers with optional flappy keyboard covers and stylis, and the Pro 4 is the best yet. Sadly, reports of bugs and problems have surfaced in recent weeks, but Microsoft has said it will fix them. The base model is powered by an energy-efficient Core m3 processor, and while its 4GB of memory is a bit low for today's computing, it's still perfectly good for web browsing, using MS Office applications, watching movies and listening to music. More powerful versions with more memory are available.

If your new computer budget doesn't extend much further than the price of a meal for one at one of Britain's many high-street burger bars, then you should check out the Raspberry Pi Zero (tinyurl.com/phfs8hb). It's small even by the standards of the Raspberry Pi, yet has enough power to help enthusiasts of all ages and abilities undertake projects, learn how to program and generally just have fun. Remarkably, it costs a meagre £4. I pay more than that for my Singapore noodles on a Friday night.



Something I'd also like to get my hands on is the Samsung 950 Pro (tinyurl.com/onqgahl). It's a tiny SSD that slots into a motherboard's M.2 slot and uses the PCI-E bus to provide ultra-fast data transfer speeds. It isn't the first SSD to do this, but it is accessible and not prohibitively expensive. An ultrafast SSD that takes up less room than a regular 2.5" SSD? I'm saving my tuppences already.

I'm technologically obsessed enough to covet items but sensible enough not to buy things I don't need on impulse. Something that has constantly battered my consciousness with temptation for the last 12 months, though, is the Roland AIRA MX-1 (tinyurl.com/os5okma), which is a hybrid music production and DJ mixer. It has a built-in multi-channel audio interface to allow DJs and producers to interact with music production software as well as hardware devices. Who knows? Maybe 2016 is the year when I finally succumb to temptation and buy one.

If you haven't already, please let us know what you think represents the best of 2015 and what you're most looking forward to in 2016.



Andrew Unsworth has been writing about technology for several years, he's handy with a spanner and his handshaking skills are second to none

Hardware



Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*

Gaming

The Big PC Games Of 2016

Adam Jensen's back and more augmented than ever in the eagerly awaited *Deus Ex: Mankind Divided*

This week, Ryan takes a look at some of the most exciting games of 2016, from *Deus Ex: Mankind Divided* to the new online shooter from Gearbox...

Plug & Play

A new year's upon us, with it the promise of lots of new and exciting games. When it comes to single-player titles, few 2016 games are as anticipated as Eidos-Montreal's *Deus Ex: Mankind Divided*. It's already been five years since the straight-up classic *Human Revolution*, and it's fair to say that Eidos hasn't rushed to get the sequel to our screens; originally due out in February, its release was pushed back until 23rd August – all the better to give Adam Jensen's latest sci-fi adventure more spit-and-polish.

Once again, *Mankind Divided* will give us multiple ways of attacking its futuristic scenarios; we'll be able to approach missions stealthily or via violent, full-frontal assaults – as ever, most missions can be completed without spilling a drop of blood, as you'd expect

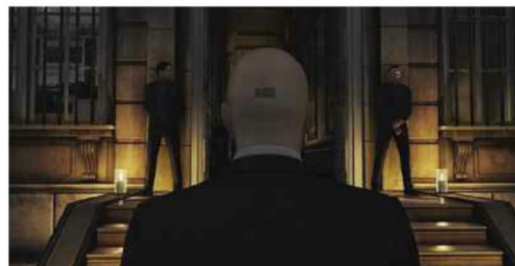
from a *Deus Ex* game. *Mankind Divided* promises to be bigger, as you might expect, but also more complex, with a new and larger range of augments providing more player choice than ever. Hacking, sniping, brutally taking down enemies hand-to-hand or simply smashing through walls – it's all in a day's work for the cybernetic warrior, Adam Jensen.

Less futuristic, but no less violent, IO Interactive's *Hitman* is out on 11th March. An attempt to reboot the long-running series after the mildly disappointing *Hitman: Absolution*, this new outing for unspeakably tough assassin Agent 47 will take the format back to the more open-ended action of the earlier series entries. As in the *Deus Ex* games, *Hitman*'s more expansive level designs will allow players to tackle the various infiltration and assassination objectives in

just about any way they choose: does offering a target with an axe sound more enticing than using a sniper rifle? *Hitman* lets you do just that.

In a first for the series, *Hitman* will be episodic, with the Intro Pack released in March coming with six missions set across three locations – France, Italy and Morocco. To keep us interested, there'll be a total of 800 targets to bring down, 40 signature kills, plus extra events added each week. In the months after release, extra sandbox locations will be available as paid-for content – set in Thailand, Japan and the USA, they'll bring with them more missions and targets.

Will this new, episodic approach help *Hitman* compete against rival franchises like *Assassin's Creed*? All we can say is, we're looking forward to finding out.



▲ IO Interactive is going for a more open-world approach in its *Hitman* reboot, with missions allowing for all kinds of creative kills and stealth techniques



▲ Gearbox Software are hoping to replicate the success of the *Borderlands* series with *Battleborn*, its new first-person shooter

Online

Gearbox enjoyed a massive success with *Borderlands* and its sequel, but it's fair to say that, outside that franchise, the studio hasn't enjoyed quite the same level of praise – you only have to look at the reviews of the sorely disappointing *Aliens: Colonial Marines* or *Duke Nukem Forever* to realise that.

With *Battleborn*, however, Gearbox hopes to return to the kind of form that made *Borderlands* such a hit. The studio has said in the past that it's the most ambitious game it's undertaken so far – a first-person sci-fi shooter with elements from the fashionable MOBA genre. There'll be a total of 25 characters to choose from, each one wildly different from the last. When *Battleborn* held a closed beta test back in October 2015, players reported a few matchmaking and balancing issues – one character in particular, the sword-wielding Phoebe, was flagged up as being a bit too powerful for comfort. But beta testing's designed to winkle out just these kinds of balancing issues, of course, and with the game not due for launch until 3rd May, there's still plenty of time for such things to be ironed out.

Battleborn's big rival comes from a worryingly formidable force in online gaming: it's Blizzard and its potentially huge entry into the shooter space, *Overwatch*. While *Battleborn* and *Overwatch* have plenty to distinguish them – *Overwatch* is a six-on-six squad shooter with no Deathmatch mode, while one of *Battleborn*'s big draws is likely to be its competitive Melt Down arena mode – *Overwatch* has a considerable amount of marketing weight behind it. Like *Battleborn*, *Overwatch* is a sci-fi shooter with a colourful and eclectic range of characters to choose from – these include an armour-clad scientist gorilla named Winston and a black-robed, dual-pistol-wielding mercenary called Reaper.

Again, like *Battleborn*, *Overwatch* will be available for a one-time payment rather than free-to-play. But neither Gearbox nor Blizzard have announced how they'll monetise their games post-launch; will they try to introduce microtransactions, as the makers of *Payday 2* controversially attempted to in late 2015?



▲ From the ashes of *Project Titan* comes *Overwatch*, Blizzard's expensive-looking sci-fi shooter. A potential *Team Fortress 2* beater? Quite possibly

It was announced in December that *Overwatch* would feature free DLC characters and maps, but game director Jeff Kaplan refuses to be drawn on "additional monetisation".

"We haven't locked in exactly whether there'll be additional monetisation after launch or not," Kaplan told *Eurogamer*.

"Some of that is because we want to watch the launch itself and see how successful that is, and see what sort of player base we end up with and see how engaged they are."

Gearbox hasn't discussed the topic so far, but it's safe to say that microtransactions are a sensitive subject among gamers. Exactly how Blizzard and Gearbox decide to fund their games after launch could prove decisive when it comes to their long-term future.

Incoming

Away from all the big, expensive games of 2016, the indie title we're looking forward to is *The Witness* by Jonathan Blow. His is the mind behind the platform-puzzler classic, *Braid* – and if you've played that, you'll know how adept he is at breathing new life into an aging genre.

Like a cross between *Myst* and Croteam's excellent *The Talos Principle*, *The Witness* is a first-person jaunt around a seemingly deserted island full of interlocking puzzles, accessed by via small, innocent-looking panels with 2D mazes on the front of it. Solving them will lead the player to other, trickier puzzles, which gradually reveal more of the island's secrets.

The Witness could be another classic, and is worth checking out from 26th January.



▲ It may only be Jonathan Blow's second game, but the brilliance of *Braid* means we're genuinely looking forward to his new puzzle adventure, *The Witness*

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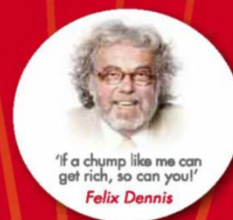
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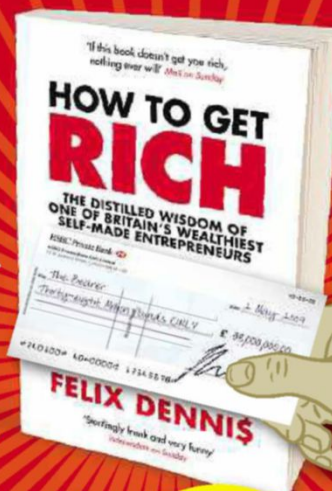
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Aaron

Not Helping

I have a problem with my internet connection that I really hope you can help me with. I have my home wi-fi set up, and the router is working fine (I have no problems on other devices), but I cannot get online with my Windows 8 PC. I get an error message that seems to stop me connecting, and I'm not sure what to try.

The error reads, "Exception ESocketError in module ISHelper.exe at 000F14DB," and it happens every time, no matter how many times I restart. It's been doing this for a few days now, and to get online I have to either use my phone or borrow my son's laptop, which isn't ideal. Can you help? I don't know how much longer I can keep my son happy without his games.

Lou

After some research, I've found that the error message you're seeing looks to be related to a program called iSkySoft Studio. It's a video editing and conversion tool. It also appears to be identified by some as a potential threat, so there may be illegitimate versions shown in Task Manager that could actually be malware.

To begin, if the program is legitimate and you do have the iSkySoft app, I'd try uninstalling it first, as this may help fix the problem or at least confirm that it's causing it. Remove it and try connecting to your wi-fi to see if you can get online.

If you don't have the software, you may have a malware infection. In this case, you need to run malware and anti-virus apps to scan your system and remove the infection. Make sure you do a deep scan here, and ideally run the scan and removal process in Safe Mode.

Before we proceed with any other fixes, let's make sure you can actually connect to the router. To do this, the easiest way would be to log into your router's setup. Usually you'll do this via your web browser using an IP address such as 192.168.1.1, although this may vary depending on your router.

If you can get to your setup, then you can 'see' the router. The next step is to see if you have an IP address via wi-fi and can see the outside world at all. To do this, open up a command prompt and type 'ipconfig /all'. This will give you a lot of information. You need to look for the wi-fi entry and ensure you have an actual IP address, provided by your router.

Look for the section headed with 'Wireless LAN adapter wi-fi' and check that the entry Ipv4 Address has a value. If it does, and if you also have DNS and gateway info, your router is doing its job and you have a connection, meaning your browser or other software is the problem, not your connection or wi-fi hardware. If you don't have an address, the problem may lie with your wi-fi hardware or setup. You could simply do the last step to check both router and IP, but it's good to ensure you can get to your router's setup regardless.

Next, try disabling wi-fi and using a wired connection. This will rule out any problems with wi-fi and is a great way to check for software-related problems. If you still can't get online, it's highly likely software or malware is the problem.

To carry on with some fixes, assuming your hardware and wi-fi are fine, try starting your browser without any add-ons. Most browsers have this ability within their settings, so check this and run the program. This will load the browser without any extras, so you can see if there's anything interfering.

Another possibility rests with a Microsoft Fixit tool. Seen in knowledge base article 811259, you can get this from support.microsoft.com/en-us/kb/811259. It's for specific, older versions of Windows, but it's been reported by some users to be of use for this problem. It's worth a try. Just be sure to create a restore point first.

Failing this, I'd try checking the usual suspects. Ensure drivers are up to date, Windows is updated, and maybe even try a different browser if you haven't already. Good luck.

*iSkySoft could be a real program,
but it could also be malware*

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Email: david.maddams@icloud.com

Wanted: I have a BCL 2.4g Wireless Gaming Mouse, Model: RF0P77 (3v 7ma) but no Drivers. Can someone help with a copy of the Original Drivers for this Wireless Mouse?
Email: Cliff Evans
cliffordevans603@btinternet.com

Wanted: Driver disc for Toshiba L30-11D PSL33E laptop. Laptop useless without drivers but only worth £40, so cannot pay a lot.
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Gaming Shutdown

I just installed a new AMD Radeon R9 2GB GPU into my machine, which replaced my old card, as it was getting a little overworked. The installation went well, but now when I come to play games such as the new *Just Cause 3* and *Fallout 4*, I cannot. The game loads up as normal, but after around 30 seconds to a minute, my PC restarts. I get no error message or anything; it just reboots.

I've tried multiple games, and it seems to do the same on each, at least newer games. I seem to be able to run some older games, and if I stay in Windows it's okay, but as soon as I fire up anything remotely modern, it reboots.

I've got the latest drivers, as I downloaded them before I installed the card, and the computer sees the card properly (it shows up in its own software and Device Manager), so I'd welcome any help, as I can't figure it out. I'm running Windows 8.1.

Mitch

I'd say you could be suffering from one of two major causes here, Mitch, and that's either overheating or a lack of power. If you've upgraded to a more powerful GPU but you haven't made allowances for the increased heat such a card can generate or the greater need for power, you could run into this kind of problem. As the problem lies with new games, which will tax the system more, requiring more power and generating more heat, it makes this even more plausible.

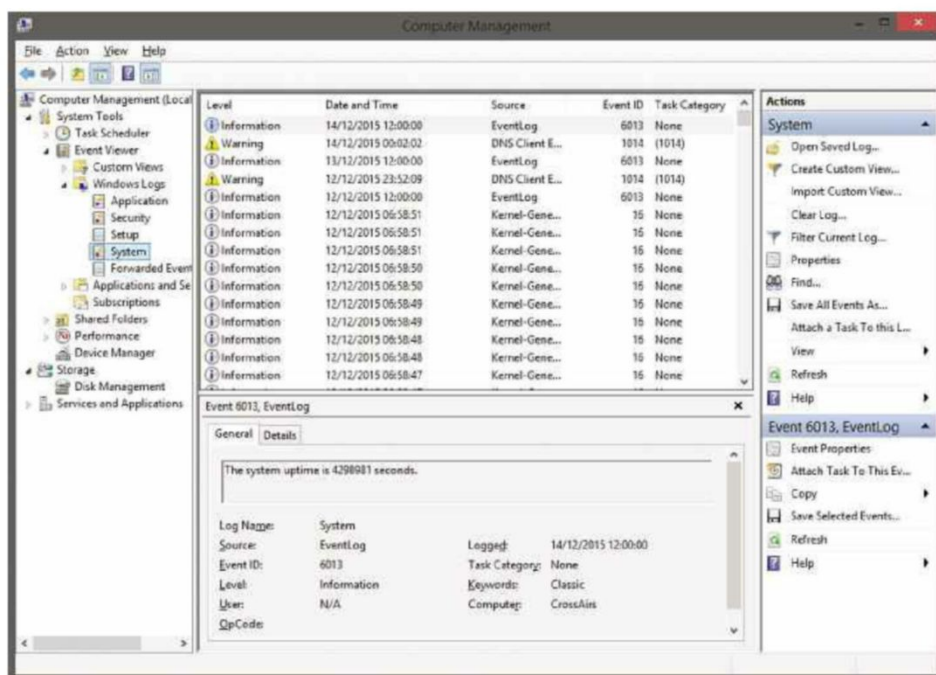
The AMD Radeon R9 2GB minimum specification states that it needs at least a 500W power supply (600W if you're using CrossFire), so you need to double-check that your PC meets this requirement. If you don't, the simple problem is a lack of power when the card needs it, and you'll need to upgrade your PSU. Running games is an intensive task for the GPU, and it's here where more power is needed. Older games may not tax the system as much, which explains you being able to still run them.

Check your system has good airflow and that all fans are working, including on the GPU itself, if it has them. Try running the PC with the case open, just to check if heat build-up is the cause. I suspect the lack of power more as your culprit, but overheating can also cause this problem.

Finally, to shed some more light on the problem and its possible cause, go into Windows' Event Viewer (Right-click 'This Computer' and select 'Manage', then

click 'Event Viewer'). Check through the various logs for timestamps that line up with the reboot. You may find entries that help you narrow down the cause.

“ Check your system has good airflow and that all fans are working, including on the GPU itself ”



▲ Event Viewer can help you investigate problems



▲ More powerful GPUs need more power and better cooling

ASK JASON



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While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

Keep It Clean

On the recommendation of a friend, I'm running AVG PC TuneUp. The initial scan has found a number of problems with the Windows registry, and I'm wondering if it's safe to let the program fix these for me. Could it cause damage? I know that altering the registry isn't usually recommended.

Also, is the program worth buying? It seems to include a lot of useful features, in particular the file-recovery tool and disk defragger. At the moment I'm using the 15-day trial. I admit I'm not especially tech-savvy, so I'd appreciate your advice. I don't want to waste my money.

S Stevens, Gmail

Registry cleaners are snake oil, really. To my knowledge, removing redundant entries has never been proven to speed up a PC's performance. The same goes for registry defragging. There's usually no harm – I've never personally run into trouble, though it's true that messing with the registry is a dangerous business – but the benefits are only psychological. I guess it's nice to know things are neat and tidy.

That's not to say that PC TuneUp is rubbish (some readers may know it better as TuneUp Utilities). It's decent enough. My issue is that, as you say, there's

a price. Direct from AVG, a one-year, one-PC licence currently costs a staggering £23.74 (goo.gl/mwkc5E), though on the likes of Amazon it can often be found for under a tenner. In my view, it's not good value even then.

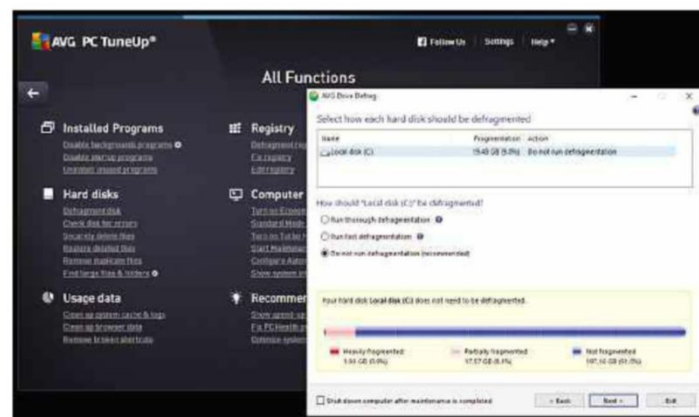
*You see, other tools are available that'll do all of TuneUp's tasks for free. To defrag an HDD (don't let it within 100 yards of an SSD, of course), try Defraggler: goo.gl/3m6NAw. * For a duplicate-file finder, try SearchMyFiles: goo.gl/9P03KW. For file recovery, try Glary Undelete: goo.gl/GDNEBv. And if you really do want to clean your PC's registry, try CCleaner: goo.gl/bezxmr.*

To manage start-up programs, simply use Windows. In Windows 8.x and Windows 10, right-click the Start button, open Task Manager, and hit the Startup tab. In previous versions of Windows,

type 'msconfig' in the search bar, press the enter key, and again hit the Startup tab. The start-up managers in programs such as PC TuneUp are just fancy front-ends for the same functionality.

** The benefits of defragging an HDD are vastly overstated. Some people like to defrag on a weekly basis, but that's usually pointless. Under normal usage, it can take many, many months for a disk to become fragmented enough to significantly affect performance, and it's mostly a factor only once a disk is close to being full. A defrag every six months is probably more than enough for most users.*

▼ *Paid-for optimisation suites are useful if you want everything in one place, but there are countless individual programs available that will perform the same tasks for free*



Bits And PCs

This week I have been mostly...

...reading that the council in a town in North Carolina has rejected plans for a solar farm on the grounds that it would suck up too much of the sun's energy (no, it's not satire – see goo.gl/5Z5cS8).

...playing with my retro computers and consoles as I sort them out in my loft and properly document them (the current favourite is a GoldStar 3DO, and next out of the box will be an Amiga 1200).

...watching an old advert for the awesome Evel Knievel Stunt Cycle (goo.gl/507XxC), a toy that was very nearly as good as the advert depicted (I had two, having worn the first one out).

...listening to my sister rant about Microsoft because her Canon PIXMA MP220 printer

doesn't work under Windows 10 (this is really Canon's fault, of course).

...feeding the neighbour's cat (I think she spends more time here than there, sometimes curling up at the bottom of my bed and staying overnight).

▼ **Anybody still got one?**



Out Of Control

I've upgraded my laptop to Windows 10, and during installation I bypassed 'Use express settings' and clicked Customize. I then disabled all the settings I thought would infringe on my privacy. I'd now also like to disable automatic updates, but I understand this is a feature only in the Pro edition. I prefer to stay in control, so is there any way to achieve the same thing in the Home edition?

Dawid, Staffordshire

Sort of. Click the wi-fi icon in Windows 10's system tray (where the clock is) and select 'Network settings'. In the window that appears, select 'Advanced options', then move the slider under 'Set as metered connection' from Off to On. You'll now be able to control updates manually (non-critical ones, anyway) – you'll just receive notifications directing you to 'Update & security' in Settings.

Bear in mind that metered connections apply on a per-router basis, Dawid, so if you take your laptop elsewhere and connect to a router that has the slider to Off (almost a certainty), pending updates will start to download almost immediately.

In general, an automatic-update policy is a good idea. It means that nearly all users are running the same build of the OS, which improves customer support and bug reports, and it also means no one's left

with unpatched security holes. The metered option is intended for PCs on restricted data plans – those using 3G or 4G from tethered smartphones, for instance. The option isn't available if a PC's connected via Ethernet, which is odd, as not all fixed-line broadband plans are unlimited.

It's worth noting, Dawid, that using the metered option may cause Windows 10's live tiles to remain static. Apparently, too, certain Microsoft programs may cease to

function correctly, though Microsoft doesn't go into detail about that. Non-Microsoft programs will update as before – most web apps (Gmail, Facebook, and so on) give no manual control, for example – and I think even Microsoft's own OneDrive service will still continue to sync. That can be the biggest data muncher of all!

▼ When it comes to Windows updates, many people prefer the manual approach



Taking The P

The other day I drove past a billboard advertising Sony's Xperia Z5 Premium. The headline feature was the 4K display, and I've now looked into this. Apparently, the resolution is 3840 × 2160. Impressive, I'm sure, but how is this 4K?

dubbed Ultra HD or UHD or UHD-1, which makes more sense. The thinking is that 3840 is close enough to 4000 that we may as well just call it 4K, but surely it then follows that Full HD could be called 2K. But no. Apparently, 2K only starts at 2048 × 1080 (another DCI standard). Confusing? I genuinely believe it's meant to be...

Ben, Plusnet ▼ When is 4K not really 4K?

I'm with you here, Ben. The original 4K standard, currently used in cinemas and often dubbed 4K DCI (after Digital Cinema Initiatives, LLC), has a resolution of 4096 × 2160. I'm quite happy with the 4K moniker for that, though the actual projected area is usually a little less.

But here's an interesting point (I may be stretching the definition of 'interesting', to be fair). For some reason – probably because bigger numbers are always better – the computing industry has now started marketing display standards by their horizontal resolutions, whereas previously it's used the vertical resolutions. For example, Full HD or FHD has a resolution of 1920 × 1080 and is often called 1080p. By this measure, 4K DCI would be called 2160p – and sometimes it is!

As illustrated by the Xperia Z5 Premium, the consumer 4K standard has a resolution of 3840 × 2160 (doubling 1080p's resolution on both sides, resulting in four times the number of pixels). This is sometimes



Crowdfunding Corner

Best of 2015

In a break from our regular format, we thought we'd kick off 2016 with a look back on some of 2015's biggest crowdfunding projects. How did they do? And perhaps more importantly... how are they doing NOW?

1. Pebble Time

The second-most funded crowdfunding effort of all time ran in March 2015 with the launch of the Pebble Time smartwatch, which followed up two previous crowdfunding successes from the company. Its \$500,000 goal was met 40 times over with a final result of \$20,338,986. You can now buy a Pebble Time for £128 off Amazon – though if you'd backed the project straight away it would've cost closer to £100!

2. Flow Hive

The Flow Hive was an Indiegogo success story, and the 7th most-funded project of all time. The campaign, completed in April 2015, was for a home beehive kit with a valve that allows keepers to extract honey without disturbing their bees. The makers were aiming for \$70,000 and got \$12,174,187 and their invention became global news. You can buy the frames for an existing hive for \$259, compared to \$230 when the project was running.

3. BauBax Travel Jacket

This multi-functional jacket incorporated every feature you can imagine for a piece of clothing, including things like a built-in inflatable neck pillow, eye mask, gloves, earphone holder, drinks pocket and who knows what else. The project ran in September 2015 and raised almost \$10m. They don't seem to have shipped just yet despite being promised as early as November 2015, but this is well within the normal delays for crowdfunded products so we wouldn't worry yet.

4. Exploding Kittens

The card game designed by various people, including Matthew Inman (of *The Oatmeal* webcomic fame) topped \$8.5 million on Kickstarter in February, despite asking for just \$10,000. The game cost \$20 during the original campaign and its modest format means there were no issues bringing it to market. You can pick a copy up now for £15 from *The Oatmeal's* webstore. If we've seen any trend in projects over the last few years of Crowdfunding Corner, it's that the less ambitious the project, the greater the chance it'll all run smoothly!

5. Shenmue III

A long-awaited return for a much-beloved game series, *Shenmue III* is due for release on PC and PS4 and reached \$6.3m after asking for just \$2m. Game-based Kickstarters haven't had a hugely illustrious history (the insanely long delays on *Broken Age* and *GODUS* spring to mind) but *Shenmue III's* developers aren't taking any chances. The game isn't even due until December 2017, so we won't know how they're really doing until this time two years from now!

Hopefully you've enjoyed the crowdfunding projects we've highlighted over the past year, some of which made it onto this list, some of which didn't.

Either way, we're looking forward to finding out what the inventors and innovators of the world come up with in the coming year. See you next week, then!



Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!

App Of The Week

Poke

Cheats never prosper, but it sure beats losing

This week's app looks at the semi-unethical activity of cheating in games. While many of you reading this will automatically look away in disgust at the very thought of having to cheat to beat a computer, others will quite happily shrug their shoulders and couldn't care less, just as long as they can finally beat that end-of-the-level guardian.

Cheating in computer games has been around for as long as the computer game itself. The cheats come in many forms: as some kind of hidden code that the developer saw fit to include, as a separate application that activates the cheat when the game is running or as a hardware attachment that offers pre-programmed enhancements for the game in question. Either way, it's still a cheat.

Poke It!

Years ago, during the 8-bit computer era, you could cheat in a game by writing a small program beforehand, which would 'poke' a particular memory address and allow you to substitute the values in the game with your own. These values usually followed the form of infinite lives, more money, full energy or whatever. The actual BASIC command was Poke and worked by simply typing in 'Poke address,

value'; the trick was knowing what address to Poke.

The programming behind using Poke may have gone the way of the dinosaur, but the concept still exists. This week, we look at a very handy application called, unsurprisingly, Poke.

Codefromthe70s.org

Poke is described as the ultimate gaming utility, which can allow you to cheat in a variety of modern games. So says the developer, codefromthe70s.org, aka Marton Anka.

It's a very small package, weighing in at just under 1MB when unpacked, and the latest version can be downloaded from goo.gl/HMYQSK.

How Does It Work?

Getting Poke to work is quite clever and, once you get used to it, remarkably easy. Once downloaded, unpack and install, then launch the game in question. In our example, we decided to test it on the excellent *Faster Than Light*.

Once the game has launched and you've started playing, make a note of one of the values that you wish to Poke; in our example, we used the starting value of Scrap (or in-game cash) as 30.

Features At A Glance

- You can finally win!
- Works with pretty much every game going.
- No need to involve dodgy 'trainers'.
- If at first you don't succeed, cheat!

Now start Poke and click on the 'Refresh' button. You should now see a list of running applications in the Poke window, and your game should be among them. Double-click the game in the Poke list, and you'll be presented with a blank screen containing various columns: Description, Address and so on.

Click on 'Add' and enter the value as a DWORD that you currently have in-game – 30 in our case. Click on 'Next', and Poke will search for all values relating to '30' or whatever you entered.

The next step requires you to go back to the game and spend some of that value in order to change it from the entered number (30 for us) to a new value (10 after we spent 20 Scrap). When you've done this, enter the new value into Poke and click 'Next'.

Keep going until Poke tells you that there are only two values left. Tick the 'Add all locations' box, followed by 'Next' and enter a name for the value, such as Cash, for example.

You'll now have two entries in the Poke window (Cash#1 and Cash#2). Double-click the 'Current Value' column and enter your own number – '999' for example. If the in-game value doesn't change, try the other; it will be one of the two.

Cheater!

There we have it: instant in-game cash or whatever. Pity it doesn't work in real life. [mm](#)



▲ An increase from 30 cash to 99999. Not bad for a day's work



▲ Enter the initial value, then change the value in game

Logging Off

I was recently with a friend at the pub, who told me a story about his recent work experience. It reminded me why I work for myself and not in some refuge for poor middle management.

It was a simple story of boy meets girl when they both go for the same job, girl gets job for which boy was more suited, fun ensues. Before irate of Ipswich calls, the fact she's a 20-something woman and he's a white middle-class older man is irrelevant to this narrative.

No, the twist is that it soon becomes apparent that she's entirely out of her depth technologically in what is a technical role. So my friend, probably foolishly, looks at some of her output and simply explains how with a simple modification it would be so much better and efficient.

Next thing, he's being dragged in front of his line manager and being told he's being troublesome, because she doesn't understand the very simple change he's provided.

Have you ever been here? I have.

I was in this exact space when in 1997 I worked in the automotive industry, and in that situation I worked not in IT but the engineering department. At the time, nobody in IT had any PC knowledge, as they liked 'big tin', which is an excuse to give IBM huge amounts of money for remarkably duff AS400 performance.

At the time, what we really needed was a Novell Netware PC network, and I lobbied for this and even suggested that I'd help IT set it up.

Those in charge of that department resented the idea that their very expensive IBM mini-computer might be undermined, and actually were entirely obsessed with the complete control that a centralised system offered them.

Months went by, and my relationship with the IT department plummeted, as they fumbled around and tried to entirely ignore the needs of the departments around them.

Eventually they announced, like it was their idea, that there would be a PC network and eventually published a specification for what they intended. In this document was the antithesis of my thinking; a LAN Manager (OS/2) server, combined with Apricot 386SX diskless workstations over thin Ethernet!

Predictably, I wrote a long memo entirely tearing this plan a new one, and pointing out the numerous and mostly obvious points

EDITORIAL

Editor: Anthony Enticknap
theeditor@micromart.co.uk

Designer: Laura Jane Gunnion

Designer: Kevin Kamal

Bonus John: John Moore

Contributors: Mark Pickavance, Jason D'Allison, Joe Lavery, Sven Harvey, Simon Brew, Dave Edwards, Ryan Lambie, James Hunt, Mark Oakley, Roland Waddilove, Turkey, Sprouts, Beer, Sarah Dobbs, David Hayward, Michael Fereday, Ian McGurran, Aaron Birch, David Briddock, Craig Grannell, Kevin Pocock, Andrew Unsworth, Dave Robinson, Keir Thomas, Rob Leane, Chris Hallam

Caricatures: Cheryl Lillie

ADVERTISING

Group Ad Manager:

Andrea Mason
andrea_mason@dennis.co.uk

Sales Executive:

Joe Teal

Tel: 0207 907 6689

joe_teal@dennis.co.uk

US Advertising Manager

Matthew Sullivan-Pond

matthew_sullivan@dennis.co.uk

MARKETING

Marketing Manager:

Paul Goodhead

Tel: 0207 907 6393

PRODUCTION

Production Coordinator:

John Moore

Tel: 0207 438 2074

MicroMartAdCopy@gmail.com

Digital Production Manager:

Nicky Baker

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NEWSTRADE SALES

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David Barker

DENNIS PUBLISHING

Group Publisher:

Paul Rayner

paul_rayner@dennis.co.uk

Managing Director:

John Garewal

Group Managing Director:

Ian Westwood

COO: Brett Reynolds

CEO: James Tye

Company Founder: Felix Dennis

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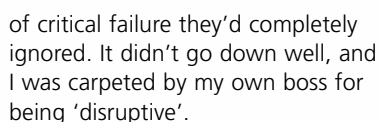
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It was even suggested to me that I should go and work for IT by the head of finance, like the best way to help idiots would be to work directly for them.

The system was deployed, and it was horrendously bad, entirely as I'd predicted. The server was inherently unstable. When it crashed, because all the workstations had booted their version of Windows off it, they also crashed, and any work that people had open was lost forever.

It also couldn't handle the demands of everyone coming to work at the same time of day, because simultaneously launching 40-plus copies of Windows over an unswitched 10Mbit network was never actually going to work.

Eventually, I left that company, so I didn't have to witness it reward failure and mediocrity on a daily basis, but obviously their good work goes on elsewhere it appears.

LAST WEEK'S CROSSWORD

Across: 7 Home Secretary, 8 Derive, 9 Sprite, 10
ActiveX, 12 Cache, 14 Geode, 16 Pro Rata, 19 Skivvy, 20
Mishap, 22 Quadrilateral.

Down: 1 Pole, 2 Gemini, 3 Referee, 4 Brush, 5 Sterna, 6 Crotchet, 11 Checksum, 13 Grammar, 15 Divide, 17 Raster, 18 Cynic, 21 AJAX.

DISCLAIMER

The views expressed by contributors are not necessarily those of the publishers. Every care is taken to ensure that the contents of the magazine are accurate but the publishers cannot accept responsibility for errors. While reasonable care is taken when accepting advertisements, the publishers cannot accept any responsibility for any resulting unsatisfactory transactions. Thanks to the way the Christmas schedule works, this issue doesn't come out until early January, even though we're putting it together in mid-December. It also means we're producing it in the same week as the previous issue, which means we've already told you everything of note that we've done lately. That makes writing

this bit a lot more difficult than normal, so we'll tell you a story a chap named Russell once told us, which is perfect for times just like this: Mrs Miggins came out of her house, looking for her cat, and called, "Here kitty, kitty. Here kitty, kitty, kitty, kitty, kitty, kitty, kitty, kitty, kitty, kitty, kitty, kitty, kitty... Actually, on second thoughts, that wasn't a good story at all. Instead, here's a story we made up right now. Once upon a time, there was a man who came back from the future. He had a mission to save a woman, whose future son would become the leader of the human race in a fight against the machines... No, that's the plot of *The Terminator*. Okay, forget the stories and have a great 2016!

THIS WEEK'S CROSSWORD

Across

7 Three-terminal resistor with a sliding contact that forms an adjustable voltage divider. (13)

8 Walk leisurely and with no apparent aim. (6)

9 Dispute the truth, validity, or honesty of a statement. (6)

10 A hard nonresilient rubber formed by vulcanizing natural rubber. (7)

12 Electromagnetic radiation that can produce a visual sensation. (5)

14 An extremely happy, peaceful, or picturesque period or situation, typically an idealized or unsustainable one. (5)

16 A unit of information equal to 1000 megabits. (7)

19 A state of near-unconsciousness or insensibility. (6)

20 Linux distro which names new releases after characters of the movie Happy Feet. (6)

22 Oust or exclude from a group or membership by decree. (13)

Down

1 The process of starting a computer and putting it into a state of readiness for operation. (4)

2 Direct onto a point or target, especially by automatic navigational

aids. (4,2)

3 A program designed for general support of the processes of a computer. (7)

4 The thing or area being discussed.
(5)

5 Originally developed by Borland as a rapid application development tool for Windows. (6)

6 Rules in Chinese philosophy that govern spatial arrangement and orientation in relation to patterns of yin and yang and the flow of energy. (4,4)

11 The main part of a printed work, excluding items such as headings and footnotes. (4,4)

13 A large hemispherical brass or copper percussion instrument with a drumhead that can be tuned by adjusting the tension on it. (7)

15 An elementary particle that participates in weak interactions; has a baryon number of 0. (6)

17 Originally spun off from Asus in 2002 in order to compete with companies like Foxconn for the commodity OEM market. (6)

18 Of or relating to or being an integer that cannot be factored into other integers. (5)

21 A tiny or scarcely detectable amount. (4)



In Next Week's Micro Mart*

- Ten reasons to upgrade to Windows 10
- Is offline PC gaming becoming a thing of the past?
- The best ways to create a PDF
- Plus the usual mix of news, reviews and advice



* May be subject to change

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